

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2014 series**

**0653 COMBINED SCIENCE**

**0653/21**

Paper 2 (Core Theory), maximum raw mark 80

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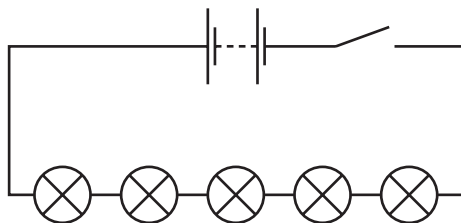
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1 (a)



circuit symbols correct ;

circuit connected correctly with 5 lamps (allow  $\pm 1$ ) ;

[2]

- (b) (i) gives p.d. required to light the lamp (for normal use)/what battery to use to make lamp work/to drive correct current ;  
don't exceed stated p.d. or may blow lamp/too high current (owtte) ;

[2]

(ii)  $R = 1.2/0.1 = 12 \text{ } (\Omega)$  ;

[1]

(iii) Total resistance =  $5 \times 12 = 60 \text{ } (\Omega)$  ; *allow ecf*

[1]

(iv) ohm ;

[1]

[Total: 7]

2 (a) B C ;  
(B C) D A ;

[2]

(b)

material	description
<b>element</b>	can be found in the Periodic Table
<b>element</b>	cannot be broken down into simpler substances
<b>mixture</b>	contains different types of molecules
<b>compound</b>	only contains molecules which are identical but each molecule contains more than one type of atom

; ; ; ; [4]

(c) (i) fuels ;

[1]

(ii) flammable ;

[1]

(d) (i) carbon dioxide ;  
water ;

[2]

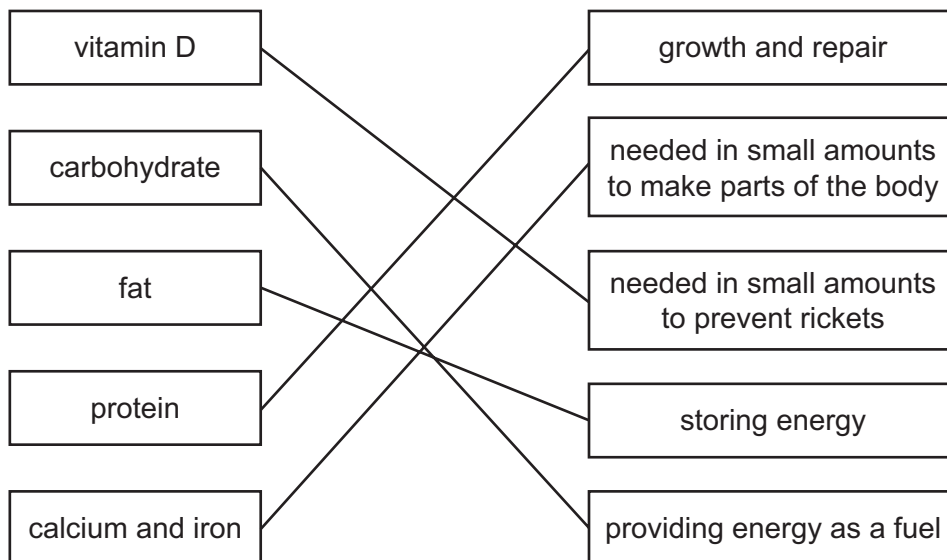
(ii)  $\text{C}_3\text{H}_8$  ;

[1]

[Total: 11]

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3 (a) (i)



(all 4 correct = 3 marks, 3 correct = 2 marks, 2 or 1 correct = 1 mark)

[3]

(ii) prevents constipation ;

[1]

(b) (i) meal 2 is balanced / meal 1 is not balanced / not enough vitamin C/D / not enough fibre / not enough iron / calcium ;  
meal 1 contains too much fat / carbohydrate / energy ;  
Jill does not need so much energy in food because of her lifestyle ;

[max 2]

(ii) e.g. apple (no mark)  
adds fibre / vitamins C/D ;  
or  
milk (no mark)  
adds calcium / vitamins C/D ;  
or  
any food (no mark) and valid point that addresses the reasons mentioned in (b)(i) ;

[1]

[Total: 7]

4 (a) (i) initial any between 8 and 14  
final 7 ;

[1]

(ii) initial violet / purple  
final green ;

[1]

(iii) neither acid nor alkali in excess ;  
(chemical) reaction / neutralisation ;  
Ref. to acid has pH < 7 / low pH ;

[max 2]

(b) (i) repeat without indicator ;  
using same volumes of solutions ;

[2]

(ii) evaporation / heating to remove water ;

[1]

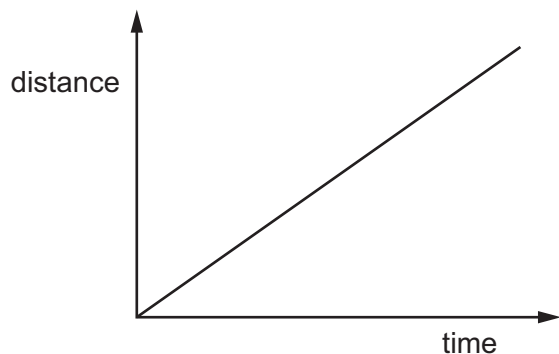
[Total: 7]

Page 4	Mark Scheme	Syllabus	Paper
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- 5 (a) (i) **A** cell membrane ;  
**B** vacuole ; [2]
- (ii) **X** label line to green area and **Y** label line to white area ;  
green color contained in chloroplasts ;  
which are only present in cell X ;  
or  
white area does not contain chlorophyll/chloroplasts ;  
which are absent from cell Y ; [3]
- (iii) black/blue black or shaded area matching green area of leaf and labelled black ; [1]
- (iv) chlorophyll/chloroplasts needed to make starch/for photosynthesis/to trap light ; [1]
- (b) (i) enzyme is denatured ;  
not the optimum pH for the enzyme ; [2]
- (ii) pancreas/salivary glands/small intestine/stomach ; [1]
- [Total: 10]**

- 6 (a) (i) weight of the aircraft: **R** ;  
thrust of the engines: **Q** and force of the brakes **S** (both needed, correct way round) ; [2]
- (ii) thrust and braking force equal and opposite ;  
unbalanced forces needed to move/accelerate (the aircraft) ; [2]
- (b) (i) chemical (energy) [1]
- (ii) kinetic (energy) ;  
gravitational/potential (energy) ; [2]
- (iii) heat/sound ; [1]

(c)



[1]

**[Total: 9]**

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- 7 (a) (i) returns carbon/carbon dioxide back to air/produces carbon dioxide from sugar/glucose ; [1]
- (ii) sugar/glucose + oxygen → carbon dioxide + water [2]  
LHS ; RHS ;
- (iii) grass → rabbit → fox/grass → rabbit → decomposer ;; [2]  
(1 mark for correct organisms in right order, 1 mark for correct arrows)
- (iv) feed on dead/decaying bodies/waste ;  
release carbon/carbon dioxide back to the air ;  
during respiration ; [max 2]
- (b) (i) combustion/burning of fossil fuels (produces carbon dioxide) ;  
reduces carbon dioxide removal by photosynthesis; [2]
- (ii) (increases) global warming/description of consequences ; [1]

**[Total: 10]**

- 8 (a) infra-red ;  
evaporates ;  
molecules ; [3]
- (b) mercury absorbs energy (from Sun)/mercury expands as temperature increases ;  
mercury particles move faster/mercury particles get further apart ; [2]

(c)

higher frequency				lower frequency		
gamma radiation	<b>X-rays</b>	<b>ultraviolet</b>	<b>visible</b>	<b>infra-red</b>	microwave	radio waves

- any one in its correct box ;  
second one in correct box ;  
third and fourth in correct boxes ; [3]

- (d) sound needs medium to travel through/can't travel through a vacuum/empty space ;  
region between Sun and Earth is a vacuum ; [2]

**[Total: 10]**

Page 6	Mark Scheme	Syllabus	Paper
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- 9 (a) (i) copper oxide + carbon  $\rightarrow$  copper + carbon dioxide  
LHS ; RHS ; [2]
- (ii) copper oxide (loses oxygen so) is reduced ;  
carbon (gains oxygen so) is oxidised ; [2]
- (b) no reaction (between copper and dilute hydrochloric acid) ;  
copper is below hydrogen in the reactivity series ; [2]
- (c) (sulfur dioxide) dissolves in rain / atmospheric water / forms acid rain ;  
collects in lakes / rivers etc. ;  
damages plants / animals ;  
effect of gas on respiratory system ;  
other correct ; [max 3]

**[Total: 9]**