

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 series

0653 COMBINED SCIENCE

0653/31

Paper 3 (Extended Theory), maximum raw mark 80

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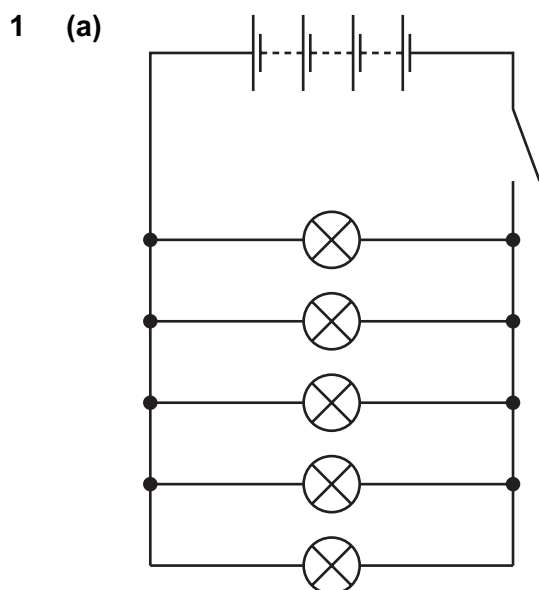
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symbols all correct ;
circuit connected correctly (*allow ± 1 cell or lamp*) ;

[2]

(b) (i) $5 \times 0.5 = \underline{2.5}$ (A) ;

[1]

(ii) (R =) V/I (or words) ;
 $= 6 / 2.5 = \underline{2.4}$ (Ω) ;

[2]

(c) series: all bulbs go out **AND** parallel: rest of bulbs stay alight ;

[1]

[Total: 6]

2 (a) **B C** ;
(B C) D A ;
(*allow 1 mark if both **B** and **A** are correctly located*)

[2]

(b) (i) catalyst ;

[1]

(ii) increases rate / frequency of collision of particles ;
increases speed of reaction / increases surface area (of catalyst) ;

[2]

(iii) (petroleum) jelly
(diesel) oil
(refinery) gas
in order ;

[1]

(iv) (petroleum) jelly
(diesel) oil
(refinery) gas
in order ;

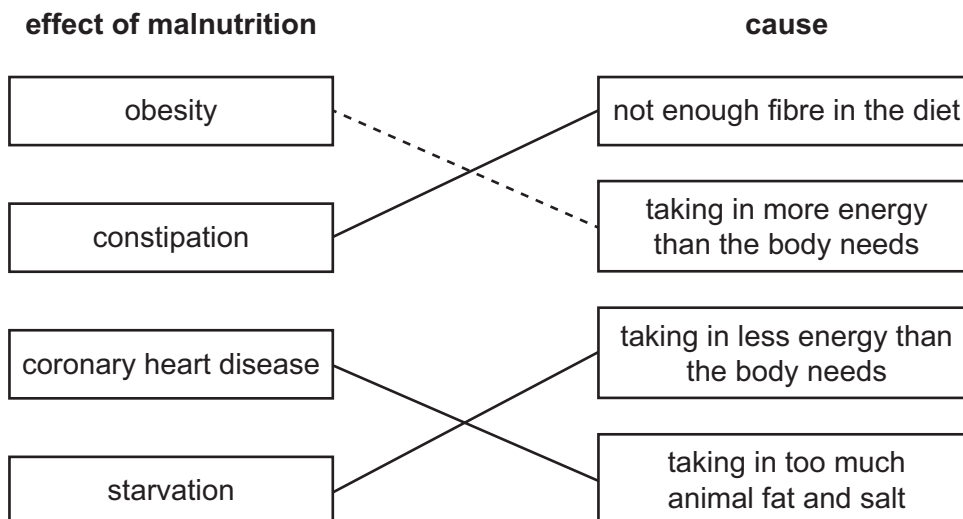
[1]

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- (v) the higher the boiling point the longer / larger the molecules ;
reference to greater / stronger intermolecular forces ; [2]
(allow reference to intermolecular bonds)

[Total: 9]

3 (a) (i)



correctly completed diagram ;; [2]
(3 correct = 2 marks, 2 or 1 correct = 1 mark)

- (ii) example of fruit or vegetable containing fibre ;
provides bulk to propel food through the intestines ; [2]
- (iii) any food rich in carbohydrate or fat / carbohydrate or fat (no mark)
reference to reducing energy intake / avoiding the carbohydrate or fat content of the stated food ; [1]
- (b) (i) more females than males / fewer males than females took exercise ;
more normal weight than obese / fewer obese than normal weight took exercise ; [2]
- (ii) reference to small sample size ;
reference to the lack of information about variables that should be controlled (if the study were to be extended) ;
reference to the need for information gathered over a longer time period ; [max 2]

[Total: 9]

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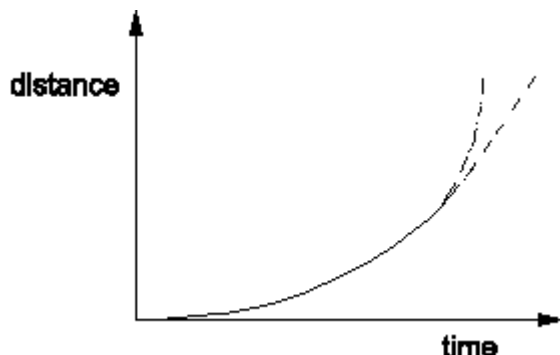
- 4 (a) (i) initial between 8 and 14 to 7 (final) ; [1]
- (ii) purple / blue to green ; [1]
- (b) (i) KCl ;
 H_2O ; [2]
- (ii) repeat without indicator / use pH meter / use indicator paper ;
using same volume(s) of solution(s) ;
evaporate (the water from the neutral mixture) / heat (the solution) then cool ; [3]
- (c) reference to the involvement of ions / ionic compound / particles with opposite charges ;
the idea of strong forces / bonds between particles that must be broken /
ions must be separated ;
(breaking bonds / separating ions) requires a large amount of energy ; [max 2]
- [Total: 9]**
- 5 (a) **X** label line to green area and **Y** label line to white area ;
green area containing chlorophyll / chloroplasts only in cell **X** /
white area does not contain chlorophyll / chloroplasts shown in cell **Y** ; [2]
- (b) (i) black or shaded in area matching green area of leaf and indicated as black ; [1]
- (ii) chlorophyll / chloroplasts traps light energy ;
for photosynthesis ;
which makes (glucose / sugar which leads to) starch ; [3]
- (c) acid denatures enzyme ;
no longer optimum pH / owtte ;
changes shape of enzyme / active site / substrate no longer fits active site ; [3]
- [Total: 9]**

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6 (a) (i) P and R ; [1]

(ii) R ;
(R) is the weight ; [2]

(iii)



(ignore whether curve becomes linear or continues to curve)

[1]

(b) (i) gravitational / potential energy and kinetic energy ; (both required) [1]

(ii) (rest of energy transferred to) heat / sound ; [1]

(c) (i) $(720 \times 1000) \div 3600$ / 200 (m/s) ; [1]
(OR $200 \times 3600/1000 = 720$ km/h)

(ii) $(KE =) \frac{1}{2} m v^2$;
 $= \frac{1}{2} \times 200\,000 \times 200 \times 200 = 4\,000\,000\,000$ (J) ; [2]
(allow ecf from (c)(i))
(allow answers in kJ or MJ provided unit is stated)

[Total: 9]

7 (a) (i) starch digested to glucose / sugar ;
(glucose / sugar) absorbed and taken to cells (of sheep) ;
(glucose broken down by) respiration ;
(respiration produces) carbon dioxide /
carbon dioxide breathed out into the air ; [max 3]
(allow reference to respiration and exhalation in the wild cat)
(allow correct reference to the formation and release of methane)

(ii) decomposers ;
feed on dead / decaying organisms / feed on waste from organisms ;
release carbon / carbon dioxide (into the air) ;
by respiration ; [max 3]

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- (b) (i) increases level of carbon dioxide / carbon monoxide ;
reduces oxygen level ;
increases sulfur dioxide level ; [max 2]

- (ii) *carbon dioxide*:
(increases) global warming / described consequence
e.g. changed rainfall patterns / floods and or droughts ;

sulfur dioxide:
causes acid rain / described consequence
e.g. chemical weathering of structures / damage to trees or aquatic organisms ;
reference to harmful effects in relation to breathing ;
(allow other valid answers) [max 1]

[Total: 9]

- 8 (a) (i) number of vibrations / waves per second / unit of time ; [1]

(ii)

highest frequency			lowest frequency			
(gamma radiation)	X-rays	ultra-violet	(visible light)	infra-red	(microwaves)	(radio waves)

all three correctly named ;
and in correct positions ; [2]
(allow 1 mark if two are correctly named and located)

- (b) (i) move further apart / increase distance between them ;
decrease / weaken / get less ;
quicker / more rapidly / faster / further apart ; [3]

- (ii) infra-red radiation (from Sun warms water) ;
(energy from sun) absorbed by water (molecules) ;
which move faster / gain kinetic energy. ;
forces between molecules are weakened / broken ;
(molecules) evaporate / leave the (liquid) surface / turn to gas / vapour ; [max 2]

- (c) (i) sound is a longitudinal wave ;
sound needs medium to travel through ;
space is a vacuum / owtte ; [max 2]

- (ii) 8 minutes / the same time / they travel at the same speed, because all
electromagnetic waves travel at the same speed through space / vacuum ; [1]

[Total: 11]

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- 9 (a) (i) exothermic ; [1]
- (ii) chemical (potential) → thermal / heat / kinetic ; [1]
- (iii) aluminium (gains oxygen and) is oxidised ;
iron (oxide) (loses oxygen and) is reduced ; [2]
(allow correct references to electron gain by iron and electron loss from aluminium)
- (iv) iron will not react with / reduce aluminium oxide ;
iron is lower in the reactivity series / less reactive than aluminium ; [2]
- (b) (i) cations / aluminium ions migrate / move / are attracted to the cathode
/ negative electrode ;
electrons flow on to ions / ions gain electrons ;
the idea that the ions are discharged as the result of electron gain ; [max 2]
- (ii) oxygen ; [1]

[Total: 9]