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

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

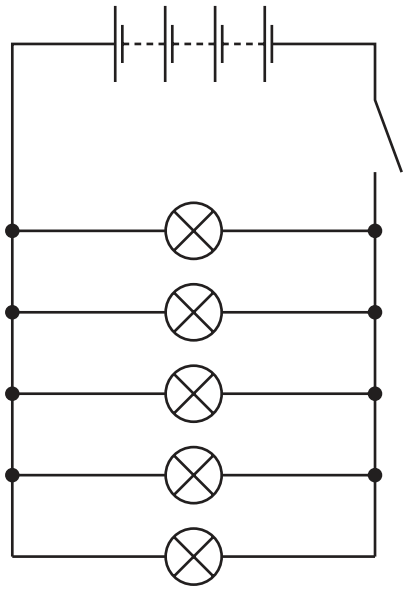
Cambridge is publishing the mark schemes for the October/November 2014 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

CAMBRIDGE
International Examinations

https://xtremepape.rs/

1 (a)



symbols all correct ;
circuit connected correctly (*allow ±1 cell or lamp*) ; [2]

(b) (i) 5 × 0.5 = **2.5** (A) ; [1]

(ii) (R =) V/I (or words) ;
= 6 / 2.5 = **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** ; [2]
(*allow 1 mark if both* **B** *and* **A** *are correctly located*)

(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]

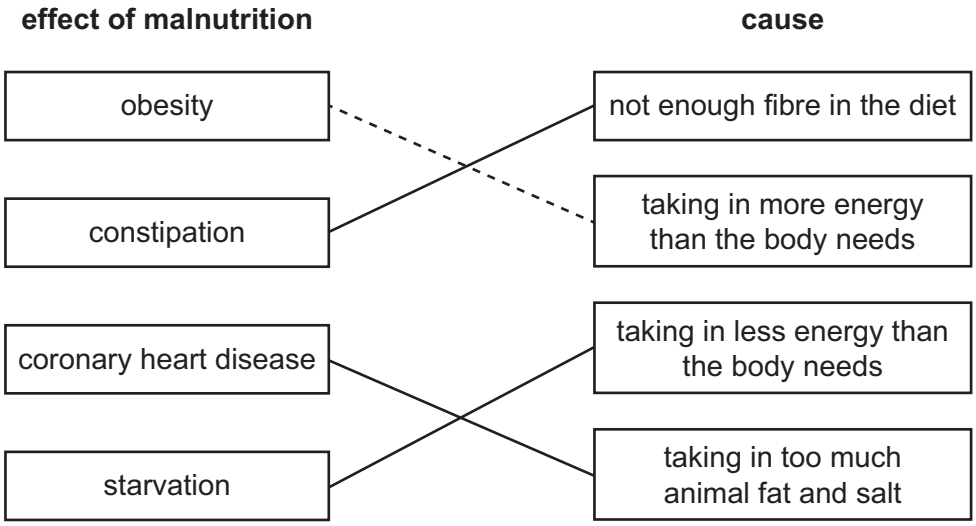
© Cambridge International Examinations 2014

https://xtremepape.rs/

(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]

© Cambridge International Examinations 2014

https://xtremepape.rs/

4 **(a)** **(i)** initial between 8 and 14 to 7 (final) ; [1]

(ii) purple / blue to green ; [1]

(b) **(i)** KC*l* ;
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 <u>light</u> energy ;
for photosynthesis ;
which makes (glucose / sugar which leads to) starch ; [3]

(c) acid <u>denatures</u> enzyme ;
no longer optimum pH / owtte ;
changes shape of enzyme / active site / substrate no longer fits active site ; [3]

[Total: 9]

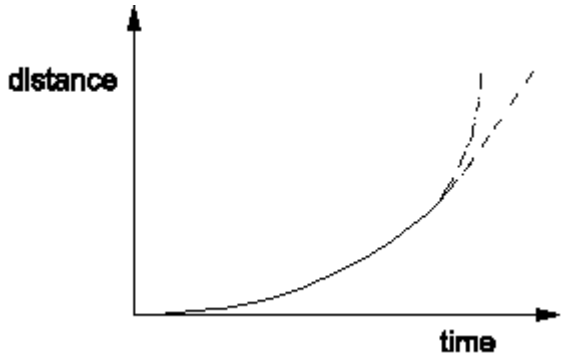
© Cambridge International Examinations 2014

https://xtremepape.rs/

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

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

(iii)



[1]

(ignore whether curve becomes linear or continues to curve)

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

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

(c) (i) (720 × 1000) ÷ 3600 / **200** (m/s) ; [1]
(OR 200 × 3600/1000 = 720 km/h)

(ii) (KE =) ½ m v^2 ;
= ½ × 200 000 × 200 × 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]

© Cambridge International Examinations 2014

https://xtremepape.rs/

(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]

© Cambridge International Examinations 2014

https://xtremepape.rs/

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]

© Cambridge International Examinations 2014

https://xtremepape.rs/