9*CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

0653 COMBINED SCIENCE

0653/22 Paper 2 (Core 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.

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1 **(a)** **(i)** hydrogen ;

(ii) rate increases (down the group) ;

(b) **(i)** melting point increases (down the group) ; [1]

(ii) mixture becomes orange ;
bromine is produced / is orange ;
chlorine is more reactive than bromine / chlorine displaces bromine ; [3]

(c) **(i)** phosphorus is (very) reactive ;
reacts with substances in the air ;
does not react with water ;
water forms a barrier ; [max 2]

(ii) phosphorus is made of molecules ;
(containing) four phosphorus atoms / diagram shows ;
(that are) bonded together / diagram shows ; [max 2]

[Total: 10]

2 **(a)** **(i)** friction ; [1]

(ii) newtons ; [1]

(iii) gravitational potential to kinetic ;
thermal / sound ; [2]

(iv) speed = distance / time ;
= 1.2/3 = 0.4 (m / s) ; [2]

(b) force ;
distance ; [2]

(c) **(i)** below 20 Hz ;
human lower threshold is about 20 Hz ; [2]

(ii) number of vibrations per second ; [1]

[Total: 11]

3 **(a)** **B** and **C** ;
they have warmth and water / moisture ;
light is not needed ;

(b) **(i)** geotropism ;
sensitivity ; [2]

(ii) flowers held up ;
where insects can reach them / attracts more insects ;
for pollination ; [max 2]

[Total: 7]

4 **(a)** **(i)** thermal ;
thermal and conduction ; [2]

(ii) communication ; [1]

(b) regular arrangement ;
all touching ; [2]

[Total: 5]

5 **(a)** **(i)** H and C / elements contain only one type of atom ;
compound contains different atoms that are bonded ;
elements shown in Periodic Table / compounds are not shown ;
compound has different properties from either element ; [max 2]

(ii) natural gas ; [1]

(iii) coal / peat ; [1]

(iv) carbon dioxide ;
water ; [2]

(b) **(i)** magnesium oxide ; [1]

(ii) *magnesium*: atoms lose electrons / become a positive ion ;
oxygen: atoms gain electrons / become a negative ion ; [2]

[Total: 9]

6 **(a)** **(i)** chlorophyll ;

(ii) carbon dioxide ;
water ;

(iii) oxygen ; [1]

(b) an animal that gets its energy ;
(from) only eating plants / without eating meat ;
OR
an animal that only gets its energy from eating plants ;; [max 2]

(c) growth ;
repair ;
for making, cell membranes / cytoplasm ;
for making enzymes / haemoglobin / antibodies / other specific substance ; [max 2]

(d) **(i)** last three boxes ticked ; [1]

(ii) more heat lost in cold environment ;
from skin / by radiation / by conduction ;
(so) more heat needs to be produced within the body / in cells ;
by respiration ;
using, food / glucose / carbohydrates (as fuel) ;
to increase fat deposits under the skin ;
for heat insulation ; [max 2]

[Total: 11]

7 **(a)** **(i)** lamp ;
cell ;
switch ; [3]

(ii) correct series circuit and all symbols correct ; [1]

(b) **(i)** geothermal / wave / tidal / hydroelectric / wind / biomass ; [1]

(ii) coal / oil / gas / peat / nuclear ; [1]

(iii) conduction requires particles / a medium ;
only radiation can pass through a vacuum ; [max 1]

(c) angle of reflection ;
45° ; [2]

[Total: 9]

8 **(a)** **P** ;
R ;
Q, R ;

(b) **(i)** any value from 8 to 14 / 8 – 14 ; [1]

(ii) pH of '7' on the screen / owtte ; [1]

(iii) (**B**)
took the least volume (to neutralise the alkali) ; [1]

(iv) reaction was exothermic / heat given off ; [1]

(v) → salt ; + water ; [2]

[Total: 9]

9 **(a)** **(i)** no nucleus ;
contains haemoglobin ;
smaller ;
has dent in the middle ; [max 2]

(ii) transports oxygen ;
from lungs to, tissues / cells ; [2]

(b) protection against disease / destroys invading microorganisms ;
phagocytosis ; [2]

(c) soluble ;
small intestine ;
adrenaline ; [3]

[Total: 9]