

9*CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

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MARK SCHEME for the May/June 2013 series

0653 COMBINED SCIENCE

0653/22

Paper 2 (Core Theory), maximum raw mark 80

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Page 2	Mark Scheme	Syllabus	
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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]

Page 3	Mark Scheme	Syllabus	
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- 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]

Page 4	Mark Scheme	Syllabus	0653
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- 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]**

Page 5	Mark Scheme	Syllabus	
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- 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]