

**MARK SCHEME for the October/November 2009 question paper  
for the guidance of teachers**

**0653 COMBINED SCIENCE**

**0653/02**

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.

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Page 2	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2009	0653	02

- 1 (a) A contains starch ;  
B contains protein ; [2]
- (b) (i) protein ;  
in living organisms ;  
that acts as a catalyst ; [max 2]
- (ii) cannot digest / breakdown starch ;  
(reject food)  
cannot absorb, starch / sugar / glucose ;  
into the blood ;  
cells do not get sugar ;  
cannot use (starch / sugar) for respiration ; [max 3]
- (iii) genes / chromosomes / DNA / mutation ; [1]  
(reject references to inheritance or blood)
- (iv) no starch in their food / starch not present in meat ; [1]
- [Total: 9]**
- 2 (a) (i) hydrogen ; [1]
- (ii) sulfur dioxide ;  
reacts with / dissolves in rainwater / forms sulfurous / sulfuric acid ; [2]  
(allow one mark for reference to CO<sub>2</sub> and carbonic acid)
- (b) (i) covalent ; [1]
- (ii) two oxygen atoms shown joined to central carbon ;  
by double bonds ; [2]
- [Total: 6]**
- 3 (a) D to C to A to B [2]
- (b) alpha radiation completely absorbed by / cannot penetrate paper ; [1]
- (c) mutates (cells) ;  
causes cancer ;  
radiation burns ; [max 2]
- (d) shielding (e.g. gloves, lead lined clothes etc.) ;  
monitoring (radiation badges etc.) ;  
limited exposure time ; [max 2]
- [Total: 7]**

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2009	0653	02

- 4 (a) (i) increase (soil erosion) ;  
soil not protected from rain by leaves ;  
soil not held by roots ;  
easily washed away ; [max 2]
- (ii) decrease (species diversity) ;  
loss of habitats ;  
loss of food supplies / disrupts food chains ;  
more hunting (by humans) ; [max 2]
- (b) (i) oil palm → rats → owls ; ; [2]  
(all organisms and energy transfer)
- (ii) oil palm is producer, rats and owls are consumers ; [1]  
(all organisms required, ignore references to the Sun)
- [Total: 7]**
- 5 (a) (i) → salt ; + water ; [2]  
(allow H<sub>2</sub>O)
- (ii) hydrogen / H / H<sup>+</sup>; [1]
- (iii) NaOH ; [1]  
(allow NaHO)
- (b) (i) iron ; [1]  
(allow Fe)
- (ii) a barrier of zinc / zinc plated onto the steel / covered with zinc ;  
which prevents (the steel from) rusting / keeps air / oxygen and water away from  
the steel ; [2]
- (iii) metals react with acid / the container would soon react and break ; [1]  
(allow corroded / dissolved)
- (c) (i) 9 ; [1]
- (ii) contains (only) hydrogen and carbon / is made of hydrogen and carbon ; [1]
- (iii) words and/or diagram which conveys  
(many) small molecules / molecules of propene join together / propene monomers  
link together ;  
to form a (long) chain (molecule) ; [2]  
(ignore mistakes in displayed formulae if meaning is clear)
- [Total: 12]**

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2009	0653	02

- 6 (a) (i) 15 s ; [1]  
(ii) 30 s ; [1]  
(iii) **CD** and **GH** / **60 – 80** (s) and **140 – 160** (s) ; [1]
- (b) constant speed / constant velocity ;  
reference to balanced forces / equal and opposite forces ; [2]
- (c) (i) may contain carbon monoxide / (products of) incomplete combustion ;  
poisonous ; [2]  
(ii) chemical ;  
heat / thermal ;  
kinetic / movement / sound / light ; [max 3]
- [Total: 10]**
- 7 (a) (i) label to palisade cell ; [1]  
(ii) label to stoma ; [1]
- (b) (i) contains DNA / genetic information ;  
which is inherited ;  
controls activity of the cell (by controlling enzymes present) ;  
store genes on chromosomes ; [max 2]  
(ii) controls what enters / leaves the cell ; [1]  
(do not allow direct references to oxygen, water, carbon dioxide)
- (c) (i) for photosynthesis ;  
(in which) water is combined with carbon dioxide ;  
to provide turgor / support / hold shape ; [max 2]  
(ii) xylem (vessel) ; [1]
- (d) (i) gas ; [1]  
(ii) diffusion / (evapo)transpiration ; [1]  
(reject evaporation)
- [Total: 10]**

<b>Page 5</b>	<b>Mark Scheme: Teachers' version</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>IGCSE – October/November 2009</b>	<b>0653</b>	<b>02</b>

- 8 (a) (i) conduction ; [1]
- (ii) (plastic is) good insulator / poor conductor ; [1]
- (b) (i) **A**, because it is a (diagram of a) solid / close (packed) and regular ; [1]
- (ii) **B**, because it is a (diagram of a) liquid / close (packed) and random ; [1]
- (c) (i) (density =)  $\frac{\text{mass}}{\text{volume}}$   
(reject unconventional symbols or units in formula)  
(volume is)  $200 \text{ cm}^3$  ;  
 $= 540 \div 200 / 2.7 \text{ (g / cm}^3\text{)}$ ; [3]  
(allow ecf for incorrect volume)
- (ii) 5.4 N ; [1]

**[Total: 8]**

- 9 (a) (i) **W** and **Y** (both needed) ;  
(carbonates react with acid to produce) carbon dioxide ; [2]
- (ii) **Y** ;  
transition metal compounds are (often) coloured (other than white) ; [2]
- (b) (i) (strong) heat ; [1]
- (ii) (copper oxide +) carbon;  $\rightarrow$  (copper +) carbon dioxide;  
(allow carbon monoxide and carbon oxide) [2]
- (iii) oxidation / reduction / redox ;  
carbon gains oxygen / copper oxide loses oxygen ; [2]
- (iv) complete circuit in which the copper forms a part ;  
circuit would indicate that copper is a conductor i.e. copper is in series with a power source and a current indicator ; [2]

**[Total: 11]**