UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

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

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International Examinations

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_2 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]

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_2O)

(ii) hydrogen / H / H^+; [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]

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]

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 =) mass ÷ volume
(reject unconventional symbols or units in formula)
(volume is) 200 (cm^3) ;
= 540 ÷ 200 / 2.7 (g / cm^3); [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; → (copper +) carbon dioxide; [2]
(allow carbon monoxide and carbon oxide)

(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]