UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

0653 COMBINED SCIENCE

0653/21 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 must be read in conjunction with the question papers and the report on the examination.

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1 **(a)** (in **B**) air / oxygen and water are present (together) / air and water needed for rusting ;
no water in **A** ;
no, air / oxygen, in **C** ; [

(b) **(i)** **W** and **Y** ;
contain only hydrogen and carbon ; [2]

(ii) does not mix with water / air / oxygen ;
sticks to, chain / steel ; [max 1]

(iii) fuel / lubrication / waxes / idea of feedstock for other chemicals / cleaning products ; [1]

[Total: 7]

2 **(a)** work done / weight = force × distance ;
= 6000 × 45 = 270 000 (J) ; [2]

(b) **(i)** motor runs ;
in opposite direction ; [2]

(ii) motor does not run ; [1]

[Total: 5]

3 **(a)** (receptor) nose / cells in nose ;
(effector) salivary glands ; [2]

(b) **(i)** catalyst ;
protein ;
speeds up / controls / catalyses, metabolic reactions ; [max 2]

(ii) to produce small molecules ;
that can be absorbed / that can move from gut into the blood ; [2]

(c) **(i)** grinding / crushing ;
make food pieces smaller / increase surface area of food ;
idea of easier access for enzymes ; [max 2]

(ii) contain calcium ;
needed for formation of enamel ; [2]

[Total: 10]

4 (a) (i) fission ;
nuclei ;
energy ;

(ii) heat energy boils water ;
steam turns turbine;
turns generator ; [3]

(b) (i) causes ionisation inside cells (not 'ionise cells') ;
damages cells / kills cells / mutation / damages DNA ;
cancer ;
radiation sickness ;
radiation burns / burns skin ; [max 2]

(ii)

radiation	*will section A turn black?*	*will section B turn black?*
beta	**yes**	**no**
gamma	*yes*	**yes**

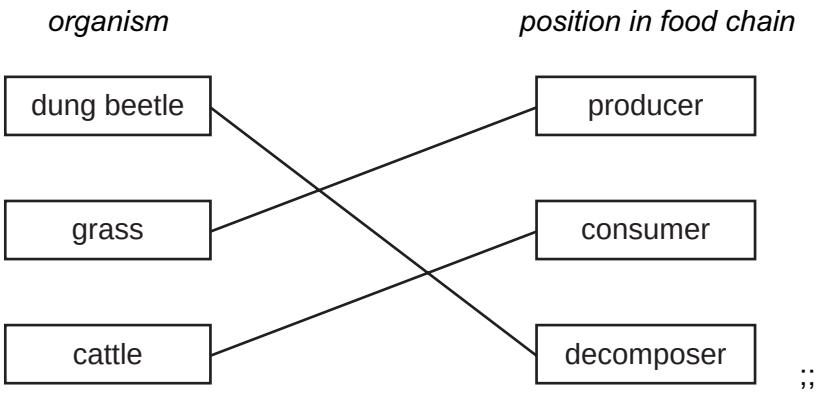
;;

(all three correct for 2 marks, 2 correct for 1 mark) [2]

(iii) alpha is unable to penetrate the, plastic / front cover ; [1]

[Total: 11]

5 (a)



;;

(2 marks for all three correct, 1 mark for any one or two correct, allow dung beetle is consumer) [2]

(b) respiration ;
carbon dioxide ;
stomata ;
photosynthesis ; [4]

(c) overgrazing / too much grass eaten ;
soil, trampled / compacted / structure damaged ;
reference to soil erosion ; [m

[Total: 8]

6 **(a)** steel ;
chlorine ; [2]

(b) **(i)** compound has, formula / fixed proportions of elements ;
compound has (different) elements bonded together ;
compound has different properties from constituents ;
(significant) energy change when compound formed ;
(or corresponding statements for mixture) [max 2]

(ii) they have different boiling points ; [1]

(c) **(i)** speeds up the reaction ;
is not, consumed / used up ;
improves, efficiency / profitability ; [max 2]

(ii) increases ; [1]

(iii) acid ;
neutralisation ; [2]

[Total: 10]

7 **(a)** increase in length proportional to load / owtte ; [1]

(b) arrow downwards from bird labelled **B** ; [1]

(c) equal and opposite ; [1]

(d) mass = density × volume ;
= 0.8 × 30 (= 24 g) ; [2]

(e) **Y** (no mark)
particles all touching ;
particles arranged regularly ; [2]

[Total: 7]

8 **(a)** **(i)** 23 ;
chromosomes ;

(ii) label to cell membrane ;
label to cytoplasm ; [2]

(iii) pointed head, reduces friction / reduces drag / streamlined ;
tail for swimming ; [2]

(b) testis ; [1]

(c) fertilisation ;
egg and sperm fuse ;
form a zygote ; [max 2]

[Total: 9]

9 **(a)** **(i)** 13 ; [1]

(ii) (potassium) feldspar ;
lilac shows potassium ; [2]

(iii) calcium / potassium ; [1]

(b) **(i)** (thermal) decomposition ;
(heating) causes a substance to break down into simpler ones / calcium oxide (and carbon dioxide) is (are) simpler substances than calcium carbonate ; [2]

(ii) *calcium oxide has lower mass / less than circled* (no mark)
mass due to carbon dioxide has been lost / part of the calcium carbonate has been lost / calcium oxide is only a part of calcium carbonate ; [1]

(iii) reaction is exothermic / reaction produces heat ;
an alkali is produced / alkaline solution / calcium hydroxide ; [2]

[Total: 9]

10 **(a)** **(i)** number of waves per, second / unit time ; [1]

(ii) less frequency range / high or low frequency sounds missing ; [1]

(iii) the frequency ranges (for **B** and **C** / both) include the human hearing range / both ranges reach the limit of human hearing / differences above 20 000 would not be detected ; [1]

(b) wavelength ; [1]

[Total: 4]