CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0653 COMBINED SCIENCE

0653/32 Paper 3 (Extended 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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CAMBRIDGE
International Examinations

1 **(a)** haemoglobin ; [1]

(b) **(i)** absorb, water / mineral ions / correct named ion ; [1]

(ii) large surface area ;
idea that more water / ions can be absorbed (at the same time) ; [2]

(c) **(i)** inner parts of at least one oval shaded ; [1]

(ii) **C**, **B**, **A** ; [1]

(iii) transpiration / evapotranspiration ;
as water vapour / reference to evaporation ;
through the stomata ;
by diffusion ; [max 3]

[Total: 9]

2 **(a)** 118 ;
7 ; [2]

(b) **(i)** accept yellow through orange ;
and brown through black (solid) ;
(reaction occurs because) chlorine displaces / oxidises the other halide / halogen ;
because chlorine is more reactive / reactivity decreases down the group ; [3]

(ii) (no)
most vigorous would be between most reactive halogen and most reactive alkali metal ;
most reactive alkali metal is rubidium / reactivity increases down Group 1 ;
student should use rubidium (with fluorine) ; [max 2]

(c) $2K + Br_2 \longrightarrow 2KBr$; ;
[1 mark for KBr, 1 mark for Br_2, 1 for balanced] [3]
(do not allow balance mark for $K + Br \longrightarrow KBr$)

[Total: 10]

3 (a) (i) particles are closer together in liquid / correct reference to density ;
particles collide / transmit energy more quickly in liquid ; [2]

(ii) greater amplitude ;
same frequency ; [2]

(iii) 10 to 20 (Hz) **to** 20 000 to 25 000 (Hz) ; [1]

(iv) sound waves – longitudinal ;
water waves – transverse ; [1]

(b) (i) (time =) distance/speed ;
= 0.0012 s ; [2]

(ii) speed = frequency × wavelength **or** wavelength = speed/frequency ;
= 330/2200 = 0.15 m ; [2]

[Total: 10]

4 (a) (i) (all) organisms and their environment ;
interacting together ; [2]

(ii) energy (flow) ; [1]

(iii) secondary consumer / third trophic level ; [1]

(iv) energy lost, between trophic levels / from one organism to another ;
not enough energy to support more than five levels ; [2]

(b) reference to sexual reproduction ;
pollination ;
bees carry pollen from anther / to stigma / to a another plant ;
pollen contains male gametes ;
reference to fertilisation (following pollination) ;
seeds formed ; [max 3]

[Total: 9]

5 **(a)** goes cloudy ;
because solid / precipitate / calcium carbonate produced ;
OR
goes cloudy and then clears ;
because precipitate / calcium carbonate forms and re-dissolves ; [max 2]

(b) **(i)** **D** ; [1]

(ii) increasing temperature increases rate / ORA ;
decreasing concentration / higher ratio water:acid decreases rate / ORA ; [2]

(iii) increasing temperature causes increase in particle speed / K.E. ;
increases frequency of collisions between acid particles and tablet ;
increases energy of collisions between acid particles and tablet ; [max 2]

[Total: 7]

6 **(a)** **(i)** R = V/I ;
= 2/0.2 = 10 Ω **and** = 4/0.31 = 12.9 Ω ; [2]

(ii) current not (directly) proportional / current does not increase as much / rate of increase decreases / begins to level off ; [1]

(b) **(i)** angle of incidence labelled and angle of reflection labelled ; [1]

(ii) 45° ; [1]

[Total: 5]

7 **(a)** **E** ;
C ; [2]

(b) **(i)** fatty acids produced ;
acids lower pH ; [2]

(ii) tube **B** was at a higher temperature ;
the reaction took place faster ;
reference to greater kinetic energy of (reacting) particles / greater collision frequency between enzyme and substrate ; [3]

(c) heart disease ;
reference to atherosclerosis / build-up of plaques / cholesterol in arteries ;

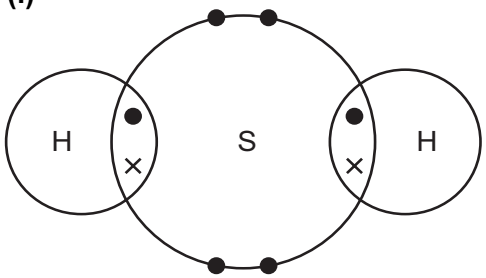
reference to obesity ;
(obesity leads to) greater risk of diabetes / heart disease / high blood pressure ; [max 2]

[Total: 9]

8 **(a)** **(i)** methane ;
methane + oxygen ; ⟶ carbon dioxide + water ; (LHS,RHS) [3]

(ii) fuels combusted reference to combustion / oxidation ;
sulfur dioxide produced ;
reacts / dissolves in atmospheric water to form acid rain ;
acidic water gathers in rivers and lakes / acid does not evaporate from lakes ; [4]

(b) **(i)**



two shared pairs ;
lone pairs on sulfur ; [2]
(max 1 if symbols missing or incorrect or if extraneous electrons present)

[Total: 9]

9 **(a)** (KE =) ½ mv^2 ;
= ½ × 0.5 × 0.5 × 0.5 = 0.0625 J ; [2]

(b) friction ;
friction between materials ;
electrons are lost from car / gained by plastic surface ;
correct reference to imbalance of positive and negative charges ; [max 3]

(c) **(i)** **D** to **E** ; [1]

(ii) **B** to **C** (no mark)
0.4 (m / s) ; [1]

(iii) **A** to **B** ;
acceleration = change in speed / time = 0.4/5 = 0.08 m / s^2 ; [2]

(iv) area under graph implied ;
= (½ × 0.4 × 5) + (0.4 × 2.5) + (½ × 0.4 × 12.5) / = 1.0 + 1.0 + 2.5 ;
4.5 m ; [3]

[Total: 12]