UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 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)** **(i)** speeds up reactions ;
provides lower activation energy route ;
without being chemically altered / owtte ; [m

(ii) transition (elements) ; [1]

(iii) 15 ; [1]

(iv) 4 ; [1]

(v) (redox means) oxidation and reduction ;
iron oxide is reduced / loses oxygen ;
hydrogen is oxidised / gains oxygen ; [max 2]

(b) **(i)** H the only other symbol ;
H × 3 shown bonded to central N, all single bonds ; [2]

(ii) (correct)
non-metallic elements bonded / it is a molecule / electrons are shared ; [1]

[Total: 10]

2 **(a)** **(i)** **C** ;
D ; [2]

(ii) resultant force to right / greater force to right than left ; [1]

(iii) gravity / weight / reaction (from ground) ; [1]

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

(ii) black surfaces emit, heat / radiation, better ; [1]

(c) speed = distance / time ;
= 330 / 1.5 = 220 (km / h) ; [2]

(d) **B** constant (speed) ;
C decelerating ; [2]

[Total: 10]

3 (a) (i) all of them / protein, carbohydrate and fat ;

(ii) (rice has) more protein ;
needed for growth ;

(iii) add Benedict's solution / Fehlings solution ;
heat ;
orange / brick red, colour indicates sugar present ; [3]

(b) (i) carbon dioxide combined with water ;
using energy from light ;
produces, carbohydrate / sugar / starch ; [max 2]

(ii) broad / fingered / spreading ;
large surface area ;
for capturing light / for absorbing carbon dioxide ; [max 2]

[Total: 10]

4 (a) (i) microwaves, ultraviolet, gamma ;;
(all three correct for two marks, one or two correct for one mark) [2]

(ii) thermal imaging cameras / grills / heat lamps ;
cooking / communication / mobile phones ; [2]

(b) (i) causes atoms to lose electrons ;
form ions ; [2]

(ii) cancer ;
radiation burns ;
radiation sickness ;
damages DNA / causes mutations ;
kills cells ; [max 2]

(c) (i) able to penetrate, the food / packaging / have high penetrating power ; [1]

(ii) to protect workforce / stop radiation escaping ; [1]

[Total: 10]

5 **(a)** **(i)** gas given off / bubbling ;
magnesium, reacts to form soluble products / gets smaller ;
gets hotter / exothermic / heat given off ; [m

(ii) (magnesium + sulfuric acid) → magnesium sulfate ; + hydrogen ; [2]

(iii) hydrogen ; [1]

(b) **(i)** unreactive / not brittle ; [1]

(ii) carbon dioxide ;
carbon monoxide ;
water ; [max 2]

(iii) reference to useful heat energy / avoids (expensive) landfill ; [max 1]

[Total: 9]

6 **(a)** label to brain ;
label to spinal cord ; [2]

(b) **(i)** receptor / sensory cells ; [1]

(ii) effector ; [1]

(c) **(i)** red blood cell ; [1]

(ii) controls what the cell does / determines what proteins are made ; [1]

(iii) controls what, enters / leaves, the cell ; [1]

[Total: 7]

7 **(a)** 8 (%) ; [1]

(b) **(i)** magnesium ;
12 protons and 10 electrons / (2) more protons than electrons ;
protons are positive and electrons are negative ; [3]

(ii) neon ; [1]

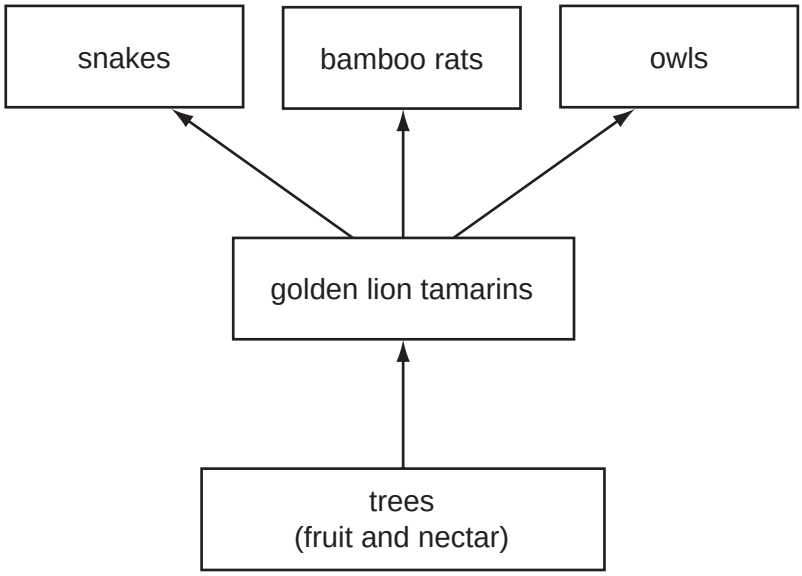
(iii) completed outer shells / no tendency to bond in order to fill shell ; [1]

(c) **(i)** electrolysis ; [1]

(ii) chlorine ; [1]

[Total: 8]

8 (a) (i)



tamarins correct ;
all three predators correct ;
all arrows in right direction ; [3]

(ii) circle drawn around trees ; [1]

(b) (i) **A** – petal ;
B – ovule ; [2]

(ii) label **P** to anther ; [1]

(iii) label **F** to ovary ; [1]

(iv) to attract, insects / birds / monkeys ;
for pollination ; [2]

[Total: 10]

9 (a) (i) voltage = current × resistance ;
= 6 × 2 (= 12 V) ; [2]

(ii) R = R1 + R2 ;
= 6 (Ω) ; [2]

(b) finite amount of fossil fuels available / fossil fuels are running out ;
burning of fossil fuels produces CO_2 ;
CO_2 contributes to climate change / global warming ;
burning fossil fuels produces acid rain / sulfur dioxide ; [max 2]

[Total: 6]