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

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1 (a) (i) speeds up reactions ;
provides lower activation energy route ;
without being chemically altered / owtte ; [max 2]

(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 ; [1]

(ii) (rice has) more protein ;
needed for growth ; [2]

(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 ; [max 2]

(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]

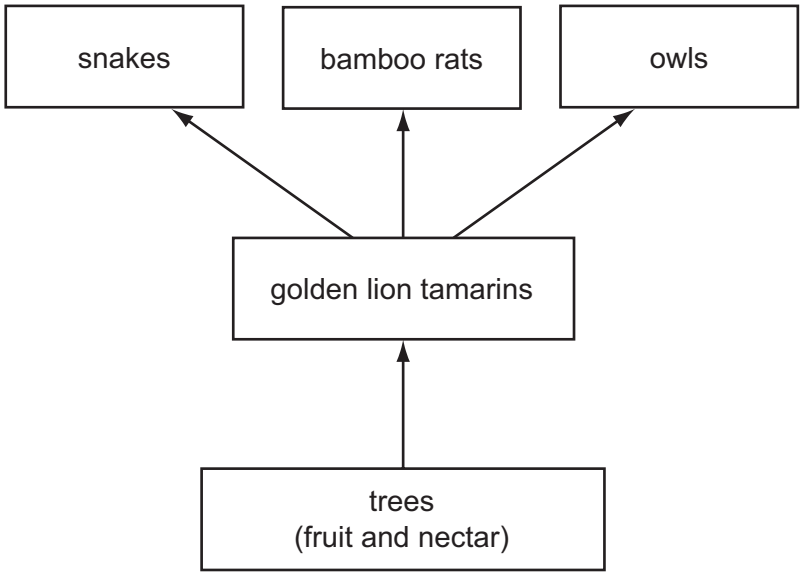
(iii) completed outer shells / no tendency to bond in order to fill shell ; [1]

(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]