UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2008 question paper

0653 COMBINED SCIENCE

0653/02 Paper 2 (Core Theory), maximum raw mark 80

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UNIVERSITY of CAMBRIDGE
International Examinations

1 (a) (i) energy transfer ; [1]

(ii) 2 producers and 6 consumers ; [1]

(iii) all of them ; [1]

(b) (i) breaking down food / large molecules / compounds ;
so that it / they can be absorbed / more easily get into the blood ; [2]

(ii) by teeth / chewing / grinding / mechanical / physical digestion ;
by enzymes ;
(allow two marks for two enzymes with correct detail) [2]

(c) carbon dioxide from air (into plant leaf) ;
photosynthesis (in plant) ;
combines carbon dioxide with water ;
(produces glucose) in chloroplast ; [max 2]

[Total: 9]

2 (a) (i) arrows vertically downward and upward ;
labeled weight / gravitational pull and <u>upthrust</u> ; [2]

(ii) balanced (no mark)
ball isn't accelerating / decelerating / changing speed ; [1]

(b) 0.3 ; [1]

(c) (i) (up/down) motion / kinetic / movement energy of waves (produces movement) ;
which makes generator turn to produce electricity /
moves magnet in a coil / moves a turbine ; [2]

(ii) solar / sunlight ;
HEP ;
geothermal ;
wind ;
tides ;
biomass ; [max 1]

(d) UV ; [1]

(e) rays are straight lines ;
rays come to a focus somewhere between the line of incident rays; [2]

[Total: 10]

3 (a) (i) crude oil / petroleum ; [1]

(ii) boiling point / boiling range / other correct ; [1]

(iii) carbon dioxide ;
water ; [2]

(iv) reference to carbon dioxide (levels increasing / out of balance) ;
carbon dioxide able to trap (radiant) heat / description of process ;
reference to greenhouse effect / global warming ; [2 max]

(b) (i) **R** – nitrogen ;
S – oxygen ;
(allow one mark if both names given but reversed) [2]

(ii) (argon is a) noble gas / unreactive (with body tissue) / stable ;
atoms have full outer shell ; [2]

[Total: 10]

4 (a) (i) (speed =) distance ÷ time / (S =) D ÷ T ;
(accept recognised symbols but not units in the formula)
(= 100/14.4) = 6.94 (m/s) ; [2]

(ii) (acceleration =) change of speed ÷ time ;
(accept recognised symbols but not units in the formula)
(= 5 ÷ 3 =) 1.67 (m/s^2) ; [2]

(b) kinetic energy changes into potential (as she jumps up) ;
at top of jump only potential energy ;
potential energy changes to kinetic energy coming down ;
kinetic energy lost as sound/heat on landing ;
chemical energy to kinetic energy within a correct context ; [max 3]

[Total: 7]

5 (a) (i) insulin ; [1]

(ii) pancreas ; [1]

(iii) affects liver ;
which removes glucose (from the blood) ;
(liver) stores it as glycogen / changes it into glycogen (within liver) /
glycogen produced ; [max 2]

(b) (i) a lot of, energy / calories / kilojoules, in fat ;
lentils and rice mostly carbohydrate ;
less energy per gram in carbohydrates than fat ; [max 2]

(ii) stops blood getting to <u>heart muscle</u> ;
so <u>heart</u> muscle is short of oxygen / oxygenated blood;
general ref. to respiration ;
(implied heart) muscle stops working ; [max 2]

[Total: 8]

6 (a) (i) protons neutrons electrons ; [1]

(ii) atoms contain 12 protons ;
(reject 12 electrons)
and 12 neutrons ;
nucleus contains 24 nucleons ; [2 max]
(reject relative atomic mass is 24)

(b) (i) magnesium + oxygen → magnesium oxide ; [1]

(ii) magnesium oxide / MgO ;
metal bonded to non-metal ;
(accept description in terms of electron transfer) [2]

(c) (i) (**A**)
reaction is between metal and an acid ;
which produces hydrogen gas ; [2]

(ii) (element)
only contains one type of atom / only one kind of chemical symbol /
a compound is two or more elements
joined together / has a formula with more than one chemical symbol;
hydrogen / H is found in the Periodic Table ;
cannot be broken down simplified ; [1 max]

(iii) magnesium sulphate / (excess) sulphuric acid; [1]
(accept correct formulae of these substances)

[Total: 10]

7 **(a)** Geiger-Muller / GM tube (detector) / counter/scalar (measurer) / spark counter ; [1]
(accept any detector even if non-quantitative)

(b) only dangerous if breathed in or ingested / ionising radiation ;
helium nuclei / large particles ;
highly ionising ;
(ionisation occurs when) electrons removed (from atoms or molecules) ;
damages / cells / DNA / causes mutations ;
causes cancer ;
kills cells ; [2 max]

(c) use ;
description ; [2]
e.g. sterilising hospital equipment ;
radiation destroys germs/bacteria on instruments ;
e.g. measurement of thicknesses ;
thickness related to % of radiation penetrating ;
e.g. use of radioisotopes in medical context / used in medicine / in hospitals ;
as tracers / selectively absorbed by organs for diagnosis or cure ;
(reject any ref. to weaponry)

[Total: 5]

8 **(a)** **(i)** **D** ;

(ii) **B** ;

(iii) **C** ;

(iv) **A** ; [4]

(b) **X** on sperm duct close to testis ; [1]
(allow anywhere from top of testis to where sperm duct goes behind bladder but not on urethra)

(c) **(i)** labels to cell membrane ;
nucleus ;
cytoplasm ; [max 2]

(ii) tail for swimming ;
only 23 chromosomes / half usual number of chromosomes, so correct number after fertilisation ;
small size so less energy needed to swim ;
streamlined so that it can move more easily ;
enzymes in head to digest a way into the egg ; [max 2]

[Total: 9]

9 (a) (i) **A** ;
H or **G** ; [2]

(b) (i) (calcium carbonate → calcium oxide +) carbon dioxide ; [1]
(CO_2 **not** acceptable as alternative)

(ii) (thermal) decomposition ; [1]

(iii) add (dilute) acid / further strong heat ;
bubbles of gas which turn limewater milky ;
then not all calcium carbonate has reacted/ora ; [3]

[Total: 7]

10 (a) (i) on
off
on ;; (all correct = 2, two correct = 1) [2]

(ii) cell/battery ; [1]

(b) 6 Ω and 4 Ω ;
in series ; [2]

[Total: 5]