UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2007 question paper

0653 COMBINED SCIENCE

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

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1 **(a)** leaf / **C** ; [1]

(b) **P** to cell membrane / vacuole membrane ;
Q to nucleus ;
R to chloroplast ; [3]

(c) add to <u>boiling</u> water ;
then to <u>hot</u> alcohol ;
rinse in water ;
add iodine (solution) ;
blue/black colour produced; [max 3]

(d) sexual ;
anthers ;
ovules ; [3]

2 **(a)** **(i)** arrows going down/convection current with cold air direction labeled; [1]

(ii) convection; [1]

(iii) (cold air) is denser/ has particles which are closer together;
flows / drops to bottom of fridge;
displaces warmer air; [2]

(b) $R = V \div I$ / resistance = volts ÷ current/amps;
= 240 ÷ 0.04=6000 (Ω); [2]

(c) aluminium reflects radiation back;
polystyrene stops heat traveling through;
by conduction /convection;
(salvage mark, if none of above then one mark for saying that the structure is preventing heat from the outside entering the refrigerator) [3]

3 **(a)** 4; [1]

(b) **(i)** speeds up the reaction; [1]

(ii) transition metals; [1]

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

(ii) O=O / fully correct dot and cross diagram; [1]

(iii) ..2. H_2O_2 → ..2. H_2O + O_2; [1]

4 **(a)** respiration ; [1]

(b) by decomposition (of dead organisms / bodies);
decay organisms / detritivores / decomposers ;
example of decomposer e.g. bacteria/fungi;
respire ; [max 2]

(c) dead / once living organisms / plants / animals / bacteria ;
do not decay fully ;
in anaerobic / airless / absence of oxygen / waterlogged conditions ;
idea that they are compressed and buried ;
reference to long timescale [max 2]

(d) **(i)** burning fossil fuels / named fossil fuel / other fuels e.g. wood; [1]

(ii) carbon dioxide concentration rose before humans were burning fossil fuels /
clear implication that carbon dioxide levels high in the past (before possibility of human activity); [1]

(iii) global warming / temperature rise / worsening of greenhouse effect;
one effect mentioned, e.g. sea level rise ; [2]

5 **(a)** **(i)** weight / gravity;
friction/air resistance; [2]

(ii) weight / gravity is greater than air resistance / $\mathbf{F_1}$ greater than $\mathbf{F_2}$; [1]
allow ecf

(b) (average) speed = distance/time;
= 400 000/80= 5000 km/h; [2]

(c) **(i)** there is no difference; [1]

(ii) weight will be less on the moon / 900N on earth 150N on moon /
different because gravity lower on moon; [1]

(d) solar energy / sunlight; [1]

6 **(a)** reaction is exothermic / gives out heat (energy) / because of the heat released; [1]

(b) **(i)** the idea that there are two potassium atoms / ions for every one oxygen / two potassium particles are bonded to one oxygen/oxide; [1]

(ii) atom has same number of protons as electrons;
positive ion has more protons than electrons; [2]

(c) (green) to purple / blue;
(metal oxides produce) alkaline solutions; [2]

(d) **(i)** KOH; [1]

(ii) hydrogen;
lighted splint;
pops; [3]
allow ecf for correct test /result on incorrect gas

7 **(a)** **(i)** sub-Saharan Africa ; [1]

(ii) the more HIV/AIDS, the more TB ; [1]

(iii) immune system cannot work properly / T cells do not work;
unable to destroy TB <u>bacterium</u> ; [2]

(b) less oxygen taken in ;
oxygen needed for energy release by <u>respiration</u> ; [2]

(c) **(i)** gonorrhoea ;
syphilis ; *(accept others e.g. chlamydia, genital warts, herpes)* [2]

(ii) use of condom / keeping to one partner / abstinence if a person has HIV /
use of antibiotics; [1]
also allow the term, preservative, protection

8 **(a)** arrows in right direction;
ray of light from tooth to mirror and mirror to eye;
approx correct angles; [3]

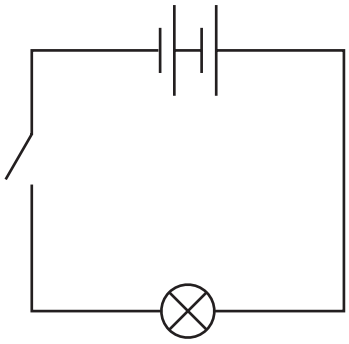
(b) **(i)** a value in the range 10 to 20 Hz;
a value in the range 20 000 to 25 000Hz; [2]

(ii) number of waves produced/passing per second; [1]

(iii) light/heat/thermal/nuclear/electrical/kinetic/potential/chemical; [1]

(c) **(i)** one cell is back to front; *ignore reference to blown bulb.* [1]

(ii)



[1]

9 **(a)** **(i)** iron/Fe; [1]

(ii) sodium/Na; [1]

(b) alloy is a light material/ has a low density;
low mass material need for planes;
less fuel needed;
alloy is stronger;
alloy resists corrosion; *(allow does not corrode but reject the word rust)*
aircraft does not break up in flight; [max 3]

(c) **(i)** iron oxide;
reduction is loss of oxygen / or strong implication; [2]
(also allow description of electron gain by <u>iron ions / Fe^{3+}</u>)

(ii) steel is stronger;
steel is less brittle;
steel is more resistant to corrosion; *(allow it does not rust)* [max 2]

(d) Cl_2; [1]