

MARK SCHEME for the October/November 2007 question paper

0653 COMBINED SCIENCE

0653/02

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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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Page 2	Mark Scheme	Syllabus	Paper
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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 boiling water ;
then to hot 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 \div current/amps;
 $= 240 \div 0.04 = 6000 (\Omega)$; [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. H₂O₂ → ..2. H₂O + O₂; [1]

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- 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 / F_1 greater than F_2 ;
allow ecf [1]
- (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]

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- 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;
allow ecf for correct test /result on incorrect gas [3]
- 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 bacterium ; [2]
- (b) less oxygen taken in ;
oxygen needed for energy release by respiration ; [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

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

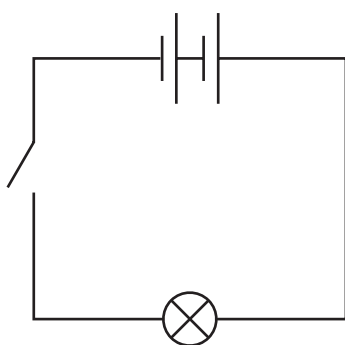
(b) (i) a value in the range 10 to 20 Hz;
a value in the range 20 000 to 25 000Hz; [2]

(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]

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- 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 iron ions / Fe³⁺)
- (ii) steel is stronger;
steel is less brittle;
steel is more resistant to corrosion; (*allow it does not rust*) [max 2]
- (d) Cl₂; [1]