

MARK SCHEME for the May/June 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
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- 1 (a) A left ventricle;
B septum;
C valve;
- (b) (i) space within the left atrium and left ventricle shaded; [1]
(ii) lungs / alveoli; [1]
- (c) arrow from the left atrium to the left ventricle and arrow from the left ventricle into the aorta; [1]
- (d) (heart) muscle does not get oxygen;
so cannot respire;
so cannot contract; [max 2]
- 2 (a) (i) proton(s) neutron(s) electron(s) labelled correctly; [3]
(ii) Li; (reject lithium)
proton number is 3 / there are 3 protons / nucleon number is 7 /
the atom will have a mass of 7 (units) / there is one outer electron
and two shells and so Q is in Group 1 and Period 2;
(reject there are 3 electrons or four neutrons) [2]
- (b) (i) hydrogen; [1]
(ii) (green) changes to blue / purple / mauve;
reaction produces an alkali / a hydroxide / causes pH to increase; [2]
- (c) it is slower / less vigorous / iron is less reactive;
very little gas produced; (accept no gas produced)
it does not make an alkali;
it produces an orange product / rust;
it needs oxygen to react; [max 2]

Page 3	Mark Scheme	Syllabus
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- 3 (a) (i) force applied;
distance moved; (in either order)
- (ii) change direction of motion of object;
change shape of object;
change the speed of an object / speed up / slow down; [max 1]
- (b) (i) **B** [no mark]
graph is horizontal; (accept numerical use of the graph) [1]
- (ii) change of speed = 28 m/s / $a = (v-u)/t$ or equivalent;
so acceleration = $28/20 = 1.4 \text{ m/s}^2$; [2]
- (c) (i) road material expands when hot; [1]
- (ii) rubber strips can be compressed / reference to general idea that rubber
accommodates movement of road material / prevent road breaking up; [1]
- 4 (a) undisturbed rainforest, because there are more different species there; [1]
- (b) 14 species are found only in the rainforest; [1]
- (c) (i) more flowers in the cacao plantation than in the rainforest; [1]
- (ii) pollination;
detail – e.g. they go to the flowers to get nectar / they brush pollen from anthers to
stigma / seeds or fruits form after pollination; [2]
- (d) sexually;
genetically;
clones; [3]
- (e) stops rain hitting the ground directly;
more roots / plants to soak up the water;
less run-off;
roots / plants hold the soil; [max 2]

Page 4	Mark Scheme	Syllabus
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- 5 (a) (i) electrolysis;
- (ii) bromine;
- (iii) so that an electric current will flow through it /
to make it into an electrolyte / so ions can move through it; [1]
- (iv) (anode) because it is the positive electrode; [1]
- (b) (i) two chlorine atoms;
are (chemically) bonded (in each molecule); [2]
- (ii) sterilise / kill harmful microorganisms;
to make water safe to drink / owtte; [1]
- (iii) $2Al + 3 Cl_2 \rightarrow 2 AlCl_3$ [1]
- 6 (a) A_2 0.15 A
 A_3 0.15 A; (both needed for mark) [1]
- (b) (i) coal / oil / gas / peat; (reject crude oil) [2]
- (ii) chemical;
kinetic;
electrical; [3]
- (iii) $V_p/V_s = N_p/N_s$;
 $25000/400000 = 20000/N_s$;
 $N_s = 320000$; [3]
- (iv) transformers only work using a.c.; [1]

Page 5	Mark Scheme	Syllabus
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- 7 (a) (i) nitrogen;
- (ii) in mixture:
 particles / atoms / molecules of the different gases are not bonded / owtte /
 gases have same (chemical) properties as when not mixed /
 any proportions possible / can be separated by physical methods; [1]
- (b) (i) fuel is burnt and burning is an oxidation reaction /
 fuel combines / reacts with oxygen; [1]
- (ii) burning hydrocarbons produces carbon monoxide / other correct toxin;
 (reject carbon dioxide)
 burning hydrogen produces mainly water; [2]
- (iii) shake with limewater;
 goes cloudy; [2]
- (c) (i) H_2SO_4 ; [1]
- (ii) sodium carbonate [1]
- 8 (a) reference to particles (needing to move);
 compressions and rarefactions / vibrations; [2]
- (b) speed = distance / time;
 = $600/2 = 300$ m/s; [2]
- (c) (i) number of waves / second; [1]
- (ii) 20 – 25000 Hz; [1]
- (d) P quieter;
 P lower pitch; [2]

Page 6	Mark Scheme	Syllabus
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- 9 (a) (i)** plasma;
- (ii)** for respiration; to release energy (from glucose);
- (b) (i)** make cell walls; [1]
- (ii)** chop / crush;
add biuret (reagent) / general reference to biuret test;
purple indicates protein; [3]
- (c) (i)** destroyed / no longer work / function; (reject killed) [1]
- (ii)** human body temperature higher than plant temperature / plant enzymes work better at, lower temperatures / the temperature in the plant; [1]