UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2006 question paper

0653 COMBINED SCIENCE

0653/02   Paper 2, maximum raw mark 80

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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.

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International Examinations

1 (a) **(i)** peat/wood/straw/biomass/biodiesel/biogas/rubbish ; [1]

(ii) 68% (40 + 25 + 3) [1]

(iii) wind/solar/geothermal/waves/tides etc ; [max 2]

(b) heat/thermal ;
water ;
turbine ; [3]

(c) to reduce energy/heat losses ; [1]

[Total 8]

2 (a) **(i)** **1** carbon dioxide ;
2 hydrogen ;
3 carbon dioxide ; [3]

(ii) HCl ; [1]

(iii) carbon dioxide – reaction with limewater ;
goes cloudy ;
OR
hydrogen – ignite/apply lighted splint ;
pops/small explosive pop ;
[error carried forward for any incorrect gas with correct test] [2]

(b) look for a temperature increase/check the thermometer reading/if temperature increases then exothermic ; [1]

(c) **(i)** volume of gas collected/volume reading from gas syringe;
time taken for the gas to collect/owtte; [2]

(ii) reduce acid temperature/acid concentration/surface area of solid ; [1]

[Total 10]

3 (a) **A** oviduct ;
B amniotic fluid ;
C umbilical cord ; [3]

(b) through the placenta ;
from its mother's blood ;
by diffusion ;
through the umbilical cord [max 3]

(c) <u>muscles</u> (in uterus) contract ;
cervix widens ;
baby pushed out through vagina ; [max 2]

(d) reference to virus/HIV ;
crosses the placenta/passes from mother's blood to baby's blood ;
(allow reference to infection at birth if clear that trauma is allowing blood to mix)

[2]

[Total 10]

4 (a) (i) first bends towards normal going through block ;
second bends away from the normal leaving the block ;　　　　　　　　　[2]
(allow one mark for consistent error carried forward if refracted ray bends away from the normal)

(ii) angle of refraction correctly labelled ;　　　　　　　　　　　　　[1]

(b) speed = distance/time = 1000/3 ;
= 333(.3 recurring) (m/s) ;　　　　　　　　　　　　　　　　　　　[2]

[Total 5]

5 (a) (i) <u>fractional distillation</u>/fractionation ;　　　　　　　　　　　　[1]

(ii) **F** ;　　　　　　　　　　　　　　　　　　　　　　　　　[1]

(b) (i) oxygen ;　　　　　　　　　　　　　　　　　　　　　　[1]

(ii) reference to carbon dioxide ;
contributing to global warming/greenhouse effect ;
which may cause climate change/specific example ;
OR
reference to sulphur dioxide/nitrogen oxides ;
react with rain water/cause acid rain ;
acid rain damages plants and animals/reacts with/weakens building materials ;
(as gases) may cause respiratory damage ;
OR
reference to carbon monoxide ;
toxic gas ;
if breathed in reduces oxygen transport on red blood cells ;　　[max 3]
OR
reference to soot/carbon/black fumes;
toxic/carcinogenic/dirty;
reference to adverse affects on human health/soiling of buildings;

(c) polymer is much larger/heavier ;
polymer is a long chain molecule ;
polymer is made when simple molecules (like ethene) link together ;
correct references to unsaturation in monomer;　　　　　　　　[max 2]

[Total 8]

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6 (a) (i) 0.1 dm^3 ; [1]

(ii) the longer the race, the more oxygen used/the longer the race the less oxygen used
per metre; [1]

(b) (i) in red (blood) cells ;
combined with haemoglobin/as oxyhaemoglobin [2]

(ii) respiration ;
in muscle (cells) ;
combined with glucose ;
producing carbon dioxide and water ; [max 3]

(c) increases reaction time ;
so slower start ; [2]

[Total 9]

7 (a) (i) correct symbols ;
series circuit ;
everything else correct e.g. correct number of cells, no additional components; [3]

(ii) 4.5(V) ; [1]

(b) (i) suitable source – named hot body ;
suitable named detector; (e.g. thermometer/thermopile);
use e.g. thermal imaging/night vision ; [3]

(ii) radiowaves/microwaves/ultra violet/X rays/gamma ; [1]

[Total 8]

8 (a)

can be hammered into different shapes	**M ;**
poor conductor of heat	
is a gas at room temperature (20°C)	
good conductor of electricity	**M ;**
poor conductor of electricity	

[2]

(b) (i) Al ; [1]

(ii) 13 ; [1]

(iii) unreactive/does not react with food/does not corrode; [1]
(references to rust disqualifies)

(c) contains more than one type of atom/element ;
bonded/joined ; [2]

(d) (i) melted/heated to melting ; [1]

(ii) <u>aluminium oxide</u> (→ aluminium +) <u>oxygen</u> ; [1]

[Total 9]

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9 (a)   *assume statements are about root hair cell unless otherwise indicated*
has a long extension/large surface area;
does not have chloroplasts ;   [2]

   (b)   (i)   2   [1]

       (ii)   across root ;
up xylem ;   [2]

       (iii)   carbon dioxide + water ;
gives glucose/starch/sugar, plus oxygen ;   [2]

       (iv)   water particles move faster when hot/more transpiration when hot/photosynthesis faster
when hot/more evaporation from leaves when hot;   [1]

                                                      [Total 8]

10 (a)   water is a good conductor of electricity ;
electricity can kill/danger of electrocution;   [2]

   (b)   alpha will be absorbed by air/skin if outside the body;
internally, radiation damages organs/cells/DNA/causes mutations/may cause cancer   [2]

   (c)   gaps allow for expansion of bridge/road materials to occur/avoids damage when expansion
occurs;   [1]

                                                       [Total 5]