

**MARK SCHEME for the October/November 2006 question paper**

**0653 COMBINED SCIENCE**

**0653/02** Paper 2, maximum raw mark 80

This mark scheme is published as an aid to teachers and students, 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.

The grade thresholds for various grades are published in the report on the examination for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

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- 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 ; [2]  
[error carried forward for any incorrect gas with correct test]

(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) muscles (in uterus) contract ;  
cervix widens ;  
baby pushed out through vagina ; [max 2]

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- (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 ;  
(allow one mark for consistent error carried forward if refracted ray bends away from the normal)
- [2]

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

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

**[Total 5]**

- 5 (a) (i) fractional distillation/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<sup>3</sup> ; [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	<b>M</b> ;
poor conductor of heat	
is a gas at room temperature (20°C)	
good conductor of electricity	<b>M</b> ;
poor conductor of electricity	

[2]

- (b) (i) Al ; [1]
- (ii) 13 ; [1]
- (iii) unreactive/does not react with food/does not corrode;  
(references to rust disqualifies) [1]
- (c) contains more than one type of atom/element ;  
bonded/joined ; [2]
- (d) (i) melted/heated to melting ; [1]
- (ii) aluminium oxide (→ aluminium + ) oxygen ; [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]**