

**MARK SCHEME for the October/November 2010 question paper
for the guidance of teachers**

0652 PHYSICAL SCIENCE

0652/02

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, which would have considered the acceptability of alternative answers.

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Page 2	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2010	0652

- 1 (a) 124 ;;
(allow 1 mark for some correct working with incorrect final answer)
- (b) $\text{CuO}_3 \rightarrow \text{CuO} + \text{CO}_2$; [1]
- (c) (i) use of limewater ;
goes cloudy/white precipitate ; [2]
- (ii) conducts electricity ; [1]
- [Total: 6]
- 2 (a) charge moves from **A** to **B**/**A** discharges through **B** ;
current is the movement of charge ; [2]
- (b) $V = IR$;
60 or .060 or 600 etc. ;
correct unit mV or V ; [3]
- [Total: 5]
- 3 (a) (i) wavelength correctly marked ; [1]
- (ii) depth decreases ;
so speed reduces ;
(mention of refraction C1 if nothing else scored) [2]
- (b) $f = 18/4$;
 $= 4.5 \text{ Hz}$; [2]
- (c) (i) ray from lamp to boy's eye reflecting off water $i \approx r$;
traced back to image ; [2]
- (ii) rays do not pass through the image ;
(accept cannot be cast on a screen) [1]
- [Total: 8]

Page 3	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2010	0652

- 4 (a) (i) hydrochloric ;
(ii) hydrogen ;
(iii) suitable drawing showing collection over water/ in a gas syringe/
by upward delivery ;
at least one correct label ; [2]
- (b) RFM of zinc chloride = 136 (g) ;
mass of zinc = 130 g ; [2]
- [Total: 6]
- 5 (a) (i) balance ;
measuring cylinder ; [2]
- (ii) mass of empty cylinder (m_1) and mass of cylinder plus sea water ;
volume of water (m_2) ; [2]
- (iii) mass of sea water = $m_2 - m_1$;
density = mass / volume ; [2]
- (b) use of density = mass / volume ;;
 $V = 250 \text{ cm}^3$ [2]
- [Total: 8]
- 6 (a) liquid is solidifying / freezing ;
(so) temperature remains constant ; [2]
- (b) energy is absorbed from the surroundings ;
ice needs energy to melt ;
water absorbs energy to raise temperature only ;
(recognition that Cora's water has to melt C1) [3]
- [Total: 5]
- 7 (a) sulfur dioxide ;
 SO_2 ; [2]
- (b) mention of acid rain ;
(mention of ozone depletion or global warning do not award this mark.)
destroys buildings, damages fish / deforestation etc. ; [2]
- [Total: 4]

Page 4	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2010	0652

8	<i>sodium</i>	11 ;	+1 ;	
	aluminium ;	13	+3 ;	
	chlorine ;	17 ;	-1	

[Total: 6]

- 9 (a) (i)** magnetised steel/magnet (accept south pole) ; [1]
 (ii) south (seeking) pole at the top and north (seeking) pole at the bottom ; [1]

- (b) (i)** a.c. supply (not battery) ; [1]
 (ii) circuit diagram with current through the solenoid ;
 controller placed in the solenoid (can be taken from the diagram) ;
 reduce the current to zero/remove controller from the solenoid (with current still on) ; [3]

- (iii)** both sets of players attracted by the controller ; [1]

[Total: 7]

- 10 (a)** hydrogen
 advantage: no pollutants produced, etc. ;
 disadvantage: expensive (to separate from water)/difficult to store, etc. ;
 ethanol
 advantage: few pollutants produced/renewable, etc. ;
 disadvantage: CO₂ emitted/uses land available for other crops, etc. ; [4]

- (b) (i)** water ; [1]
 (ii) fermentation ; [1]

[Total: 6]

- 11 (a)** alkanes have only single bonds (between carbon atoms)/saturated ; [2]
 alkenes have double bonds (between carbon atoms)/unsaturated ;

- (b)** ethane ; [2]
 ethene ;

- (c)** use of bromine (water) ;
 remains unchanged with alkane ;
 goes colourless with alkene ; [3]

- (d)** polymers/plastics ; [1]

[Total: 8]

Page 5	Mark Scheme: Teachers' version	Syllabus	
	IGCSE – October/November 2010	0652	

- 12 (a)** use of tongs/forceps/protective clothing/gloves/lead shielding/not point source;
(reject exposure time/goggles/storing in lead) ;
- (b)** background radiation ; [1]
- (c) (i)** random/spontaneous nature of emissions ; [1]
- (ii)** beta \times ;
no significant change with aluminium ;
gamma \checkmark ;
count rate above background even with lead / significant amount of radiation
penetrates the aluminium ; [4]
- [Total: 7]**
- 13 (a) (X)** steeper curve starting at the origin ;
ending at same level ; [2]
- (Y)** shallower curve starting at the origin ;
ending at same level ; [2]
- [Total: 4]**