

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2009 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	Paper
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- 1 (a) covalent [1]
- (b) correct arrangement with shared electron pair, correct outer shells [1]
- (c) any **two** from:  
 high melting point  
 electrolyte when molten or aqueous  
 crystalline  
 soluble in water  
 etc. 1 + 1 [2]
- [Total: 4]**
- 2 (a)  $R = V / I$  or  $6.0 / 2.4$   
 $= 2.5 \Omega$  1  
 1 [2]
- (b)  $5.0 \Omega$  (e.c.f.) [1]
- (c)  $I = V / R$  or  $= 6 / 5$  (e.c.f.)  
 $= 1.2 \text{ A}$  1  
 1 [2]
- [Total: 5]**
- 3 (a) substance which (is burned to) release heat / energy [1]
- (b) (i) any **two** from:  
 non-polluting / makes only water when burned  
 easy to transport through pipes  
 lights easily  
 high heat output  
 etc. 1 + 1 [2]
- (ii) has to be manufactured / etc. [1]
- (c) (i) fermentation [1]
- (ii) add to limewater 1  
 turns cloudy / milky / white precipitate 1 [2]
- (iii) fractional distillation [1]
- [Total: 8]**

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4	(a) (i) greater amplitude			[1]
	(ii) more waves on screen / waves close together (accept higher frequency / shorter wavelength)			[1]
	(b) (i) 20 000 Hz (20 kHz) (accept 10 – 30 kHz)			[1]
	(ii) $v = \text{distance} / \text{time}$ or $\text{distance} = vt$ or $320 \times 0.075$	1		
	= 24 m	1		
	but $\frac{1}{2}$ this distance = 12 m from wall	1		[3]
				<b>[Total: 6]</b>
5	(a) (i) moment = $250 \times 0.6$ = 150 (Nm)	1		
		1		[2]
	(ii) $150 = F \times 2.4$ $F = 63$ (62.5) N	1		
	(if final force (62.5 N) is correctly found and inserted into (i) score 3 out of 4 marks, ignore remainder in (ii)).	1		[2]
	(b) (i) horizontal line at 2.5 m diagonal line to time axis covering 8 s.	1		
		1		[2]
	(ii) attempt to find area under graph $(2.5 \times 12) + (\frac{1}{2} \times 2.5 \times 8)$ = 40 m	1		
		1		[3]
				<b>[Total: 9]</b>
6	(a) mixture of metals			[1]
	(b) e.g. brass ornaments / electrical terminals / etc.	1		
		1		[2]
	(c) (i) painting / chrome plating / etc.			[1]
	(ii) too dense / too expensive / not strong enough / etc.			[1]
				<b>[Total: 5]</b>

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
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7	(a) (i) radiation			[1]
	(ii) ray correctly drawn			[1]
	(iii) both angle of incidence and angle of reflection correctly drawn			[1]
	(iv) angle of incidence = angle of reflection			[1]
	(b) (i) conduction			[1]
	(ii) hot water less dense than cold therefore floats / rises to the top (mention of convection – C1)	1 1		[2]
	(c) (i) distillation			[1]
	(ii) idea of waste energy from turbine used			[1]
				<b>[Total: 9]</b>
8	(a) A turns red                      no gas	1 + 1		
	B fizzes / dissolves            hydrogen	1 + 1		
	C fizzes / dissolves            carbon dioxide	1 + 1		[6]
	(b) no change	1		
	relevant explanation about acids e.g. all contain hydrogen ions, etc.	1		[2]
				<b>[Total: 8]</b>
9	(a) splitting of <u>nucleus</u> (into two more or less equal halves) with release of energy	1 1		[2]
	(b) advantage: no greenhouse gases released / chemical pollutants	1		
	disadvantage: danger of radioactive substances leaking / difficulty of dealing with long half-life waste (do not accept explosions, etc.)	1		[2]
				<b>[Total: 4]</b>

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- 10 (a)
- |          |   |  |  |
|----------|---|--|--|
| hydrogen | 2 |  |  |
| sulfur   | 8 |  |  |
| oxygen   | 1 |  |  |
|          | 4 |  |  |
- (3 correct names = 1 mark)  
(4 correct numbers = 3 marks; 3 correct = 2 marks; 2 correct = 1 mark) [4]
- (b) 28 g  
(allow one mark for '2 atoms nitrogen' with incorrect final answer)  
(calculation of mass of one mole of ammonium hydroxide = (80) C1) [2]
- [Total: 6]**
- 11 (a) source (much) nearer to detector 1  
because alphas short range or different type of detector 1 [2]
- (b) (i) mention of background count 1  
subtracted from original count 1 [2]
- (ii) smooth curve going within 1 square of all points [1]
- (iii) clear working or  $12.5 \pm 1.0$  s 1  
 $12.5 \pm 0.5$  s 1 [2]
- [Total: 7]**
- 12 (a) faster [1]
- (b) (i) unreactive / can withstand high temperature / etc. [1]
- (ii) only small amount needed / increases surface / etc. [1]
- (c) not used up by reactions [1]
- (d)  $2\text{CO} + 2\text{NO} \rightarrow 2\text{CO}_2 + \text{N}_2$   
(correct formulae – 1 mark correct balancing – 1 mark) [1]
- [Total: 5]**

13 (a)

particle	relative mass	relative charge
electron	0 / very small / 1/2000 etc.	-1
neutron	1	0
proton	1	+ 1

[3]

(b) number of protons in an atom / nucleus

[1]

**[Total: 4]**