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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1 **(a)** covalent

(b) correct arrangement with shared electron pair, correct outer shells [

(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 1
= 2.5 Ω 1 [2]

(b) 5.0 Ω (e.c.f.) [1]

(c) I = V / R or = 6 / 5 (e.c.f.) 1
= 1.2 A 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]

4 **(a)** **(i)** greater amplitude

(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 = distance / time or distance = vt or 320 × 0.075 1
= 24 m 1
bat ½ this distance = 12 m from wall 1 [3]

[Total: 6]

5 **(a)** **(i)** moment = 250 × 0.6 1
= 150 (Nm) 1 [2]

(ii) 150 = F × 2.4 1
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)**). [2]

(b) **(i)** horizontal line at 2.5 m 1
diagonal line to time axis covering 8 s. 1 [2]

(ii) attempt to find area under graph 1
(2.5 × 12) + (½ × 2.5 × 8) 1
= 40 m 1 [3]

[Total: 9]

6 **(a)** mixture of metals [1]

(b) e.g. brass 1
ornaments / electrical terminals / etc. 1 [2]

(c) **(i)** painting / chrome plating / etc. [1]

(ii) too dense / too expensive / not strong enough / etc. [1]

[Total: 5]

7 **(a)** **(i)** radiation

(ii) ray correctly drawn

(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 1
therefore floats / rises to the top 1 [2]
(mention of convection – C1)

(c) **(i)** distillation [1]

(ii) idea of waste energy from turbine used [1]

[Total: 9]

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]

[Total: 8]

9 **(a)** splitting of <u>nucleus</u> (into two more or less equal halves) 1
with release of energy 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]

[Total: 4]

10 (a)

	2
hydrogen	8
sulfur	1
oxygen	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 ± 1.0 s 1
12.5 ± 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) $2CO + 2NO \rightarrow 2CO_2 + N_2$
(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]