UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2008 question paper

0652 PHYSICAL SCIENCE

0652/03 Paper 3 (Extended), maximum raw mark 80

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UNIVERSITY of CAMBRIDGE
International Examinations

1	(a)	(i)	use of weight = mass x *g* ;	1	
			= 2.0 N ;	1	2
		(ii)	2.0 N OR same as **(i)** ;	1	1
	(b)		arrow vertically upwards ; (allow without label if clear)	1	1
	(c)		marked clearly between 5.0 & 5.5 N ;	1	1
	(d)	(i)	1.9 ± 0.1N ;	1	1
		(ii)	use of force = mass x acceleration ;	1	
			= 9.5 m/s^2 ;	1	2

[Total: 8]

2	(a)	(i)	coating with zinc ;	1	1
		(ii)	zinc is more reactive than iron ;	1	
			when both exposed to water and oxygen zinc corrodes/reacts ;	1	
			protecting the iron/sacrificial corrosion ;	1	3
		(iii)	painting ;	1	1
		(iv)	for paint/oil/grease etc: no, if scratched the iron rusts/ OR for stainless steel: yes, because protection is throughout the alloy not just on the surface	1	1
	(b)		aluminium has an oxide layer ;	1	
			which prevents contact between the metal and oxygen/air/water ;	1	2
	(c)	(i)	makes it stronger ;	1	1
		(ii)	atoms of second metal get between aluminium metals in lattice/atoms of the two metals are of a different size ;	1	
			making it more difficult for layers of atoms to slide ;	1	2

[Total: 11]

3 **(a)** the liquid moves up the capillary tube ; 1
because it expands ; 1 2

(b) **(i)** iron, copper, constantan **ANY TWO** 1 + 1 2

(ii) temperature = 100 × 4.8/7.2 ; 1
= 67 °C ; 1 2

(ii) quick acting OR
can measure higher temperatures OR
can be remote … ; 1

low thermal capacity or can follow changing temps OR
metals used have Higher melting points than glass OR
wires can be as long as required ; 1 2

[Total: 8]

4 **(a)** 2,8,8,1 ; 1
2,8,8 ; 1
2,5 ; 1 3

(b) number of electrons in outer shell ; 1
same as Group number 1 2

(c) **(i)** CaI_2 ; 1 1

(ii) black (accept dark grey/blue) ; 1 1

(d) **(i)** boiling point increases ; 1
with increase in proton number/down Group ; 1 2

(ii) helium is less dense than air so will float/carry balloon up ; 1
argon and krypton are more dense than air so will not float/will sink ; 1
neon only slightly less dense than air, will not give enough uplift/will not make balloon rise ; 1 3

[Total: 12]

5 **(a)** waves refracted on entering shallow water ; 1
refraction correct ; 1
wavelength in deep water constant AND in shallow water ; 1 3
(if only 3 wavefronts drawn max. 2, 2 drawn max 1)

(b) **(i)** part circles centred gap ; 1
not reaching barrier ; 1
wavelength constant throughout ; 1 3
(if only 3 wavefronts drawn max. 2, 2 drawn max 1)

(ii) diffraction ; 1 1

[Total: 7]

6 **(a)** **(i)** causes acid rain/causes smog ; 1
damages buildings/trees/makes breathing difficult ; 1
(two answers must match, otherwise max 1) any two 1 + 1 2

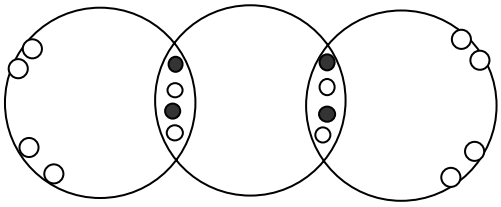
(ii) speeds up reduction of nitrogen oxide ; 1
to form nitrogen ; 1 2

(b) $C_3H_8 = (3 \times 12) + (8 \times 1) = 44$ and $CO_2 = 12 + (2 \times 16) = 44$; 1

44 kg propane produces $3 \times 44 = 132$ kg carbon dioxide ; 1
1.0 kg propane produces $132/44 = 3.0$ kg carbon dioxide ; 1

44 g carbon dioxide has volume 24 dm^3 ; 1
3.0 kg carbon dioxide has volume $1000 \times 3.0 \times 24/44 = 1636$ dm^3 ; 1 5

(c)



one mark each for:
a shared pair of electrons ; 1
four shared pairs of electrons, **two** for each oxygen ; 1
four other electrons on **each** oxygen ; 1 3

[Total: 12]

7	**(a)**	cracking ;	1	
		of an alkane/oil/petroleum ;	1	2
	(b)	$C_2H + H_2O \rightarrow C_2H_5OH$;; one mark for each side	2	2
	(c)	a catalyst/named catalyst ;	1	1
				[Total: 5]
8	**(a)**	Use of power = VI	1	
		I = 200 000 000/55 000	1	
		= 3 600 A	1	3
	(b) **(i)**	less energy loss (in cables) ;	1	
		(same power transmitted) at lower current ;	1	2
	(ii)	transformer ;	1	1
	(iii)	use of $n_1/n_2 = V_1/V_2$;	1	
		= 220 : 1 ;	1	2
	(d)	energy input = energy output ;	1	1
				[Total: 9]
9	**(a)**	electron ;	1	
		fast/energetic/from the nucleus ;	1	2
	(b) **(i)**	nucleon numbers correct:131 0 ;	1	
		proton numbers correct: 54 –1 ;	1	2
	(ii)	xenon ;	1	
		noble gas ;	1	2
	(c)	shortish half life **OR** Xe unreactive		
		long enough to do tests etc. but not too long to harm patient		
		beta correct sort of penetration **ANY TWO**	1 + 1	2
				[Total: 8]