

MARK SCHEME for the October/November 2007 question paper

0652 PHYSICAL SCIENCE

0652/03

Paper 3 (Extended), maximum raw mark 80

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1	(a)	zero accept good comment re sideways force only	1	[1]
	(b)	use of gradient OR $(v_2 - v_1)/(t_2 - t_1)$ OR $(3.5 - 20)/(3.0 - 1.5)$ 11.0 m/s ² (do not penalise sig. figs) Recognition of deceleration either by statement or minus sign	1 1 1	
	(c)	use of $F = ma = 1200 \times 11$ 13 200 N	1 1	[5]
			[Total: 6]	
2	(a)	(i) wavelength correctly marked (within 1 mm, by eye)	1	
		(ii) $f = 12/5$ = 2.4 Hz (or per s)	1 1	
		(iii) Speed = $f \times \lambda$ or 2.4×0.4 (ecf) = 0.96 m/s	1 1	[5]
	(b)	(i) gets shorter/smaller (accept wavelengths get closer)	1	
		(ii) remains the same/no change	1	[2]
			[Total: 7]	
3	(a)	(i) increase in rate with increase in temperature or vice versa (increase/decrease in rate without clear reference to temperature 1, incorrect linking – 0)	2	[2]
		(ii) Any two of: concentration; particle size (accept surface area); catalyst (not accept a named catalyst)	ANY 2	[2]
	(b)	(i) water; carbon dioxide; oxygen (accept correct formulae)	2 1	[3]
		(ii) chlorophyll (ignore spelling errors)	1	[1]
		(iii) an organic compound/protein; that catalyses a reaction/is a catalyst	2	[2]
	(c)	reduction/gains electrons/endothermic	1	[1]
			[Total: 11]	

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- 4 (a) ray continues and emergent ray parallel to incident ray 1 [1]
- (b) $n = \sin i / \sin r$ or variation 1
 $1.54 = \sin 53.1 / \sin r$ 1
 $\sin r = 0.519$ 1
 $r = 31.3^\circ$ ignore sig. figs., accept 31 1 [4]
 (Each stage in the calculation need not be shown, full credit can be scored, for the bare answer.)

[Total: 5]

- 5 (a) (i) not combined with another element/not in a compound/
 as the free element/found (in the ground) as a metal 1
- (ii) gold/platinum 1
- (iii) electrical wiring; good conductor of electricity;
 cooking utensils; good conductor of heat 4 [6]
 ornaments, jewellery, coins; can be polished/ malleable, low reactivity
 roofing; malleable
 ANY TWO USES 1 +1
 ANY TWO RELEVANT PROPERTIES 1 +1 [4]

- (b) (i) bauxite 1
- (ii) aluminium is covered by a layer of oxide; 1
- (iii) e.g. aircraft parts; low density
 window frames/malleable
 bicycles; low density
 ANY USE 1
 ANY RELEVANT PROPERTY 1 [4]

[Total: 10]

- 6 (a) (i) diode (not rectifier) 1
- (ii) produces d.c. (output)
 from a.c. (input) 1 +1 [3]

- (b) input current induces a magnetic field in the core 1
 field links (through core) to secondary coil 1
 current continuously changing so field also changing 1
 induces emf/voltage/pd in secondary coil 1
 different number of turns on primary and secondary step up/step down V 1
 [ANY 4]

- (c) $N_1/N_2 = V_1/V_2$ or variation 1
 $N_2 = 1800 \times 12 / 240$ 1
 $= 90$ 1 [3]

- (d) Use of $Q = It$ OR $= 0.2 \times 3 \times 60 \times 60$ 1
 $= 2160 \text{ C}$ 1 [2]
 (give 1 mark for 216000C)

[Total: 12]

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- 7 (a) (i) melting point;
decreases with increase in atomic number/down the group 1
+1
- (ii) magnesium +1 [3]
- (b) reactivity (with water);
increases with increase in atomic number/down the group 1
+1 [2]
- (c) (i) $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$
all formulae correct 1
balanced +1
- (ii) (it forms an) alkaline (solution) 1
- (iii) bubbles of gas/hydrogen;
given off very/more quickly
white precipitate/ goes cloudy ANY TWO 2 [5]

[Total: 10]

- 8 (a) K is the cathode/is negative 1
K/cathode hot 1
emits electrons 1
A is anode/ positive 1
accelerates/attracts electrons (not accept accelerates cathode rays) 1 [ANY 4]
- (b) (i) 25 ms 0.025 s 1
- (ii) $v = 8.0/2.5 \times 10^{-3}$ ecf 1
= 320 m/s 1 [3]

[Total: 7]

- 9 (a) (i) otherwise sulphuric acid would be left unreacted
(to contaminate the crystals)/ no sulphuric acid left 1 [1]
- (ii) molar mass of CuO 64 + 16 = 80 (g) 1
10/80 (=0.125) moles of Cu used 1
0.1 moles of acid used 1
thus more CuO than acid 1 [4]
- (b) add copper(II) oxide to sulphuric acid (warm and stir); 1
filter off excess copper(II) oxide; 1
evaporate filtrate to small volume; 1
leave to crystallise; 1
filter off crystals; 1
wash with a little cold water and leave to dry 1 [ANY 4]

(if 'filter off excess copper(II) oxide' step is omitted, maximum 3 marks)

[Total: 9]

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- 10 (a) alpha and gamma 1
 alphas stopped by paper 1
 gammas go through aluminium but stopped by lead 1 [3]
 (If α , β , and γ are given lose first mark, but score last two marks on merit, so long as they refer to the experiment.)

[Total: 3]