UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

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) — 1
11.0 m/s^2 (do not penalise sig. figs) — 1
Recognition of deceleration either by statement or minus sign — 1

(c) use of F = ma = 1200 x 11 — 1
13 200 N — 1 [5]

[Total: 6]

2 **(a)** **(i)** wavelength correctly marked (within 1 mm, by eye) — 1

(ii) f = 12/5 — 1
= 2.4 Hz (or per s) — 1

(iii) Speed = f x λ or 2.4 x 0.4 (ecf) — 1
= 0.96 m/s — 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 — 2 [2]
(increase/decrease in rate without clear reference to temperature 1, incorrect linking – 0)

(ii) Any two of:
concentration;
particle size (accept surface area);
catalyst (not accept a named catalyst) — ANY 2 [2]

(b) **(i)** water; carbon dioxide; — 2
oxygen (accept correct formulae) — 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]

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° 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
ornaments, jewellery, coins; can be polished/ malleable, low reactivity
roofing; malleable — 4 [6]
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) — 1
from a.c. (input) — +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 x 12 /240 — 1
= 90 — 1 [3]

(d) Use of $Q = It$ OR = 0.2 x 3 x 60 x 60 — 1
= 2160 C — 1 [2]
(give 1 mark for 216000C)

[Total: 12]

7 **(a)** **(i)** melting point; 1
decreases with increase in atomic number/down the group +1

(ii) magnesium +1 [3]

(b) reactivity (with water); 1
increases with increase in atomic number/down the group +1 [2]

(c) **(i)** $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$
all formlae 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/atracts electrons (not accept accelerates cathode rays) 1 [ANY 4]

(b) **(i)** 25 ms 0.025 s 1

(ii) v = 8.0/2.5 x 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]

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]