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

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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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1 **(a)** zero accept good comment re sideways force only

(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

(b) n = sin i/sin r or variation 1
1.54 = sin 53.1/sin r 1
sin r = 0.519 1
$r = 31.3^{o}$ 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) 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;
decreases with increase in atomic number/down the group +1

(ii) magnesium +1 [2]

(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
alphas stopped by paper 1
gammas go through aluminium but stopped by lead 1
(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]