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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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   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^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;   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 χ are given lose first mark, but score last two marks on merit, so long as they refer to the experiment.)

[Total: 3]