CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0652 PHYSICAL SCIENCE

0652/32 Paper 3 (Extended Theory), 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, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

1 **(a)** one extra electron added for each successive element / same number in outer shell as group number ; [1]

(b) *metals*: Na, Mg, A*l* **and** *non-metals*: Si, P, S, C*l* ; [1]

(c) **(i)** $CaCl_2$; [1]

(ii) electrons transferred ;
two (electrons transferred) ;
from (outer shell) of calcium atom, one to each (outer shell) of two chlorine atoms ; [3]

(d) six electrons in all three outer shells ;
totals of eight electrons in outer shell of sulfur ;
eight electrons in both oxygen outer shells after bonding ; [3]

[Total: 9]

2 **(a)** the point at which the whole mass of a body may be considered to act ;; [2]
(max 1 mark for use of weight **OR** stating the mass is concentrated at point)

(b) **(i)** use of mg Δh (= 75 × 10 × (2.3 – 1.1)) ;
= 900 J ; [2]

(ii) 900 J ; [1]

(c) use of $E_k = ½ mv^2$ ($750 = 0.5 \times 75 \times v^2$) ;
$v^2 = 2 \times 900 / 75$ (= 20) ;
= 45 m / s ; [3]

(d) (work done against) friction / has KE in horizontal direction as well ; [1]

[Total: 9]

3 **(a)** add excess magnesium oxide to sulfuric acid ;
(warm mixture then) filter off excess magnesium oxide ;
evaporate solution to small volume ;
leave to crystallise then filter off crystals and dry ; [4]

(b) $MgO(s) + H_2SO_4(aq) \longrightarrow MgSO_4(aq) + H_2O(l)$
one mark each for: formulae ; balance ; state symbols ; [3]

(c) relative formula mass $Mg(OH)_2 = 58$;
$MgSO_4 = 120$;
mass magnesium sulfate = 120 × 5 ÷ 58 (= 10.3 g) ; [3]

[Total: 10]

4 **(a)** kinetic energy ;
of the air molecules ; [2]

(b) 30% of the input energy / power ;
is converted to useful energy output ; [2]

(c) use of power = VI (4.5 × 103 = 230 I) ;
I = 19.6 A ; [2]

[Total: 6]

5 **(a)** **(i)** 37 (± 1) seconds ; [1]

(ii) all magnesium reacted ; [1]

(b) steeper gradient ;
ending at same final volume ; [2]

(c) 24 000 cm^3 hydrogen evolved from 24 g magnesium ;
78 cm^3 hydrogen evolved ;
mass magnesium = 24 × 78 ÷ 24 000 ;
= 0.078 (g) ; [4]

[Total: 8]

6 **(a)** **(i)** rays refracted towards axis ;
all (minimum 2) rays go through **F** ;
rays continue after **F** ; [3]

(ii) line from **F** to centre of lens ; [1]

(b) ray through optical centre ;
ray initially parallel to the axis passing through principal focus ;
rays traced back to form the image ; [3]

(c) virtual, upright, enlarged ;; [2]
(all 3 correct = 2 marks; 2 correct = 1 mark)

[Total: 9]

7 **(a)** metal has lattice of positive ions in sea of electrons ;
in pure metal layers of atoms can slide over each other easily ;
in alloy different size atoms prevent easy sliding of layers ; [3]

(b) **(i)** steel coated with layer of zinc ; [1]

(ii) does not rust even when scratched ; [1]

(iii) zinc is more reactive than iron / steel ;
reacts in preference to iron / steel / idea of sacrificial corrosion ; [2]

(c) good conductor of heat ; [1]

[Total: 8]

8 **(a)** **(i)** vary the resistance of **X** ; [1]

(ii) use of gradient (= (0.36 – 0) ÷ (4.0 – 0)) **or** identifying specific points ;
R = 1 / gradient **or** use of points ;
= 11 Ω ; [3]

(b) evidence that half diameter increases resistance ;
R = 44 Ω ; [2]

[Total: 6]

9 **(a)** has carbon to carbon double bond(s) ; [1]

(b) cracking ;
of alkanes ; [2]

(c) **n** $H_2C = CH_2$ on left ;
one mark for **n** ; [2]
(1 mark for an correct representation of one ethene molecule)

[Total: 5]

10 **(a)** **(i)** generation of an emf / current ;
conductor in a changing magnetic field / moving through a magnetic field ; [2]

(ii) input current produces the magnetic field ;
a.c. produces changing field ; [2]

(iii) (soft) iron ; [1]

(iv) easily magnetised and demagnetised ;
increases the field strength / channels the field through the secondary coil ; [2]

(b) 230 : 115 (= 2 : 1) ; [1]

(c) amplitude ≈ 1 division ;
frequency same as input ; [2]

[Total: 10]