CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level

MARK SCHEME for the October/November 2012 series

8780 PHYSICAL SCIENCE

8780/02 Paper 2 (Short Response Questions), maximum raw mark 30

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.

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1 newton = kg m s^{-2}
$k = F/rv^2 \rightarrow$ kg m s^{-2} / m m^2 s^{-2} = kg m^{-2}

[Total:

2 **(a)** velocity changes direction hence acceleration and force required [1]

(b) horizontal from anywhere on the body of the female skater pointing towards the centre of the circle. [1]

[Total: 2]

3 A*l* loses an electron in its (3)p orbital/sub-level, Mg loses a (3)s electron [1]
The electron in the 3(p) is higher energy/further from nucleus than (3)s) or is shielded by $(3)s^2$ electrons [1]

[Total: 2]

4 $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7$ [1]

[Total: 1]

5 **(a)** a species which gains electrons (in a reaction) [1]

(b) **(i)** Any one from:

$2Br^- + SO_4^{2-} + 4H^+ \rightarrow SO_2 + 2H_2O + Br_2$
$2Br^- + H_2SO_4 + 2H^+ \rightarrow SO_2 + 2H_2O + Br_2$
$2NaBr + 2H_2SO_4 \rightarrow SO_2 + 2H_2O + Br_2 + Na_2SO_4$
$2HBr + H_2SO_4 \rightarrow SO_2 + 2H_2O + Br_2$ [1]

(ii) Br^- ions/HBr molecules (lose electrons to form Br_2 or $Br_2 + H_2O$) [1]

[Total: 3]

6 Torque of a couple = product of one of the forces and the <u>perpendicular</u> distance between the two forces. [1]

[Total: 1]

7 Use of either $v = \lambda \times 1/T$ or $v = s/t$ [1]
leading to $v = 17(.1)$ m s^{-1} [1]

[Total: 2]

8 **(a)** breaking large/long molecules into shorter/smaller molecules
the smaller molecules are more useful/valuable than the long molecules [1]

(b) $C_{18}H_{38} \rightarrow 2C_2H_4 + C_3H_6 + C_{11}H_{24}$ **or** $C_{18}H_{38} \rightarrow 4C_2H_4 + 2C_3H_6 + C_4H_{10}$

correct formulae for ethene and propene
equation fully correct [1]

[Total: 3]

9 $\frac{(188 \times 1.5) + (189 \times 2.5) + (190 \times 3.0) + (192 \times 4.5)}{11.5} = 190.3$

correct numerator [1]
fully correct [1]

[Total: 2]

10 (a) Find p.d. and read current from graph, $R = V / I$ [1]

(b) thermistor/ semiconductor, resistance decreases as V increases. [1]

[Total: 2]

11 Potential difference is energy per unit charge [1]
Work done or energy transferred by the charge in going round a closed loop = energy given to it (by the source of emf) [1]

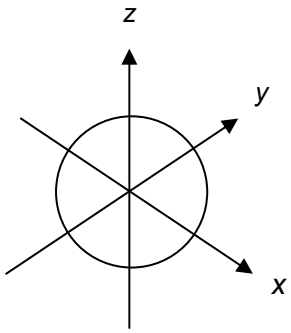
[Total: 2]

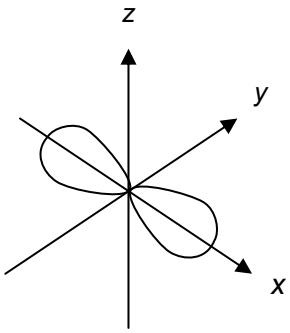
12 (a) HF has (strong) hydrogen bonding [1]

(b) HC*l* to HI have van der Waals' forces (between molecules) [1]
van der Waals' forces increase in strength with increase in number of electrons from HC*l* to HI. [1]

[Total: 3]

13 correct spherical 's' and correct 'dumbbell 'p'





do not accept diagrams with multiple shapes on one set of axes [1]

[Total: 1]

14 Any orbits allowed in Rutherford model, only allowed orbitals in Bohr model (allow orbits/ shells) [1]
No rules for electron numbers in Rutherford model, fixed numbers of electrons in each Bohr orbital [1]

[Total: 2]

15 (a) Fluctuations of readings / count rate on GM tube [1]

(b) The readings are **not** affected by external conditions (e.g. temperature, pressure) [1]

[Total: 2]