# MARK SCHEME for the October/November 2012 series

## 0652 PHYSICAL SCIENCE

**0652/22**         Paper 2 (Core 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.

1  (a)  (i)  mercury / alcohol ;                                                                                    [1]

      (ii)  expansion (of the liquid) ;                                                                        [1]

   (b)  (i)  fixed temperature ;
            which is repeatable ;                                                                              [2]
            (accept example, e.g. melting point of ice for max 1)

      (ii)  upper – 100 °C ;
            lower – 0 °C ;                                                                                          [2]

   (c)  split the gap between fixed points up ;
        100 parts **OR** equal parts ;                                                                      [2]

                                                                                                              **[Total: 8]**


2  (a)  (i)  halogens ;                                                                                            [1]

      (ii)  bromine / iodine / astatine ;                                                                  [1]

      (iii)  sodium ;                                                                                                [1]

   (b)  two correctly named compounds (one ionic, one covalent) ;;
        correct formulae (**must** get compound mark first) ;;                                   [4]

                                                                                                              **[Total: 7]**


3  (a)  point marked perpendicularly above wire on lower torso ;                           [1]

   (b)  (i)  amount of matter in a body ;                                                                [1]

      (ii)  use of W = mg (= 75 × 10) ;
            = 750 N ;                                                                                              [2]

   (c)  (i)  7.0 (m / s) ;                                                                                          [1]

      (ii)  height = area under the graph ;
            = ½ × 7 × 0.7 ;
            = 2.45 m ;                                                                                              [3]

   (d)  (i)  kinetic (energy) ;                                                                                  [1]

      (ii)  converted to heat / thermal / internal energy ;
            in the ground / his feet / surroundings ;                                                [2]

                                                                                                            **[Total: 11]**

**4** **(a)** **(i)** turns brown / pink ;                                                                              [1]

   **(ii)** $CuO + H_2 \rightarrow Cu + H_2O$ ;                                                      [1]

   **(iii)** hydrogen is more reactive (than copper) ;                                         [1]


**(b)** heat each oxide with carbon / charcoal ;
no reaction with magnesium oxide ;
copper(II) oxide turns brown / pink ;                                                      [3]

                                                                                                    **[Total: 6]**


**5** **(a)** nitric acid ;
ammonia / ammonium hydroxide ;                                                          [2]


**(b)** 132 ;;                                                                                              [2]
(allow 1 mark for use of all four relative atomic masses)


**(c)** 1 mole contains 28 g / 2 moles nitrogen ;
% is 28 ÷ 80 × 100 ;                                                                           [2]


**(d)** any sensible suggestion, e.g. cheaper / easier to handle or store / less       [1]
hazardous / etc ;

                                                                                                    **[Total: 7]**


**6** **(a)** **(i)** angle of incidence marked correctly (either on entry or exit) ;            [1]

   **(ii)** angle of refraction marked correctly (either on entry or exit) ;           [1]


**(b)** refracted ray straight and angle of refraction more than red ;
emergent ray parallel to red ;                                                                [2]


**(c)** **(i)** top ray refracted towards axis ;
bottom ray refracted towards axis ;
rays meet at principal focus ;                                                               [3]

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


**(d)** different colours refracted different amounts ;
so images formed in different places (or similar) ;                                   [2]

                                                                                                    **[Total: 10]**

**7 (a) (i)** variable resistor (accept rheostat) ; [1]

**(ii)** to vary the current in the circuit / p.d. across the constantan wire ; [1]

**(iii)** (correct symbol for voltmeter) in parallel with the main circuit ;
across the resistance wire ; [2]

**(b)** use of R = V/I (= 4.5/0.12) ;
= 37.5 ;
ohms / $\Omega$ ; [3]

**(c) (i)** reduces ; [1]

**(ii)** increases ; [1]

**(d)** less ;
charge / current has more area of wire to go through / owtte ; [2]

[Total: 11]

**8 (a)** suitable collection method ; (e.g. over water or gas syringe)
able to measure volume ; (e.g. burette / measuring cylinder / gas syringe) [2]

**(b)** (bubble into) limewater ;
turns milky ; [2]

**(c) (i)** plotting points ; [1]

**(ii)** smooth curve drawn ;;
(1 mark for 'wobbly' curve, no mark for straight line or points joined) [2]

**(iii)** acid used up ; [1]

**(iv)** steeper curve ;
levelling off at 40 cm$^3$ ; [2]

[Total: 10]

**9** **(a)** none ;
hydrogen ;
carbon dioxide ;                                                                      [3]

   **(b)** water ;                                                                           [1]

                                                                                **[Total: 4]**

**10** **(a)** 2 carbon atoms with double bond between them ;
2 hydrogen atoms bonded to each carbon atom ;                                  [2]

   **(b)** butane (accept methyl propane) ;
$C_4H_{10}$ ;                                                                          [2]

   **(c)** **(i)** double bond present / unsaturated ;                                       [1]

        **(ii)** forms polymers / undergoes addition ;                                       [1]
(accept forms named polymer e.g. polythene)

                                                                                **[Total: 6]**