MARK SCHEME for the May/June 2013 series

5054 PHYSICS

5054/41   Paper 4 (Alternative to Practical), 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

1 **(a)** **(i)** 1.046 or 1.05 seen   C1
                 1.05 s cao   unit required   A1   [2]

       (ii) large difference in raw data/
             reaction time has large variation   B1   [1]

       (iii) one drops, one times   B1
             synchronise/countdown or signal explained   B1   [2]

   (b) **(i)** axes: correct way round, labelled quantity and unit   B1

              scales: more than ½ grid, linear, not awkward
              e.g. y-axis: 2 cm ≡ 0.1 s x-axis: 2 cm ≡ 2   B1

              points plotted accurately within ½ small square
              neat crosses or small points (in circle)   B1

              smooth curve of best fit drawn   B1   [4]

       (ii) $x \times y$ seen with substitution of one set of values from table or graph   B1
             two values calculated and not equal comment   B1
             'two values of t same in table so $x \times y$ not constant'   scores 2/2   [2]

   (c) sensible suggestion, e.g.
         holds arm horizontal
         stands in same place and uses a marker
         in front of mirror and uses image   B1   [1]

   (d) mass or weight cao   B1   [1]

   (e) changes surface area/air resistance
        cases will not stack   B1   [1]

   (f) heavier so air resistance has little/same effect
       smaller % change in mass
       due to uncertainty in timing/height   B1   [1]

                                                  [Total: 15]

2 (a) (i) 1. three resistors drawn in series   B1   [1]

          2. $470\,\Omega$ cao   unit required   B1   [1]

     (ii) three resistors drawn in parallel   B1   [1]

   (b) $180\,\Omega$ cao   unit required   B1   [1]

                                             [Total: 4]

3 (a) $22(.0)\,^{\circ}\text{C}$ unit required   B1   [1]

   (b) (i) all the oil is heated/
           all oil below water surface/
           uniform heating of oil   B1   [1]

     (ii) temperature rises   B1
         then falls   B1   [2]

     (iii) avoid parallax error/good explanation
            reads top of meniscus
            aligns scale with liquid column   B1   [1]

   (c) smooth concave curve   B1
       asymptotes to above zero   B1   [2]

                                             [Total: 7]

4 freely suspends lamina from hole   B1
   correct use of plumb-line shown on diagram   B1
   line marked on lamina   B1
   repeated from different hole and find where lines cross   B1   [4]

   alternative experiments:
   balancing on a ruler can score points 1, 3 and 4 (max. 3)
   finding balance point by trial and error on a pin (max. 1)

                                             [Total: 4]