MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

0625 PHYSICS

0625/61   Paper 6 (Alternative to Practical), maximum raw mark 40

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 must be read in conjunction with the question papers and the report on the examination.

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1 **(a)** 50–250 g (or 0.05–0.25 kg) correct unit required   [1]

    (b) Centre of mass marked close to centre of cylinder   [1]
             Clear indication of how centre of mass is placed above the 90.0 cm mark   [1]

    (c) Rule unlikely to exactly balance/ difficult to balance
             OR rule could slide on pivot
             OR mass could slide
             OR centre of mass of rule not at 50.0 cm mark
             OR rule not uniform1

             Do not accept comments about poor/careless technique   [1]

    (d) Repeat readings (wtte)   [1]
             OR a reference to finding exact position of centre of mass of metre rule
             OR a reference to dealing with centre of mass of rule not being at 50.0 cm mark

    (e) Good/ fine/ reasonable/ same to 3 significant figures
             OR Within limits of experimental accuracy (wtte)
             OR Too many significant figures in experimental result   [1]

                                                            [Total: 6]

2 **(a)** θ_R = 22(°C)   [1]

    (b) Table:
             mm, °C   [1]
             Correct *d* values 100, 80, 60, 40, 20, 10   [1]

    (c) Temperature difference = 3(°C), higher   [1]

    (d) Draughts   [1]
             Room temperature/humidity   [1]

    (e) One from:
             Relevant avoidance of parallax explained, in using rule or thermometer
             Waiting time between readings
             Wait for steady thermometer reading
             Allow lamp to cool/warm up
             Repeats and average   [1]

                                                            [Total: 7]

3 (a) (i) (cm, V, A)   [no mark awarded]

   (ii) Graph:
     Axes correctly labelled with quantity and unit and correct way around [1]
     Suitable scales – plots occupy at least half the grid [1]
     All plots correct to ½ small square [1]
     Good line judgement (ecf for curve if *d* plotted) [1]
     Single, thin, continuous line [1]

   (iii) Triangle using at least half of candidate's line clearly indicated on graph [1]
      Evidence of subtraction seen [1]
      G value 1.5 when rounded to 2 significant figures [1]

 (b) Same as *G*, rounded to 2 or 3 significant figures [1]
    unit Ω/ohms [1]

                             [Total: 10]

4 (a) *d* in range 79 to 80 (mm), 7.9 to 8.0 (cm) [1]
   x = 61 (mm) and consistent correct unit for both (mm or cm) [1]
   D = 80 (cm), *X* = 61 (cm) ecf from **(i)** and **(ii)** [1]

 (b) *f* = 14.5(cm) allow ecf from **(a)** [1]
    2 or 3 significant figures and correct unit [1]

 (c) Correct statement for results (expect Yes or wtte) [1]
    Idea of within (or beyond) experimental accuracy or wtte [1]
    Can only score if previous mark is scored

 (d) Any one from:
    Use of darkened room
    How to avoid parallax when taking readings
    Movement of lens back and forth to obtain clearest image
    Mark lens holder to show position of centre of lens
    Metre rule clamped or on bench
    Object, lens and screen all perpendicular to bench
    Object and lens same height above bench [1]

                             [Total: 8]

5 (a) $V_1 = 74$ [1]
Line of sight perpendicular to scale [1]
Perpendicular line continues to measuring cylinder at surface level [1]

(b) $V_2 = 81$, $V_G = 7$ (ecf allowed) [1]
All volumes in cm^3, unit given at least once, not contradicted [1]

(c) $(V_3 - V_1) = 24$, $V_A = 17$ (ecf allowed) [1]

(d) Any three from:
V_A: Finger increases V_3 / tube not pushed in far enough
    Some water in test-tube/air is compressed
V_W: Water remaining in tube
    Water remaining in measuring cylinder
    Tube overfilled, wtte (surface tension effect) [3]
Either V_A or V_W (accept only once):
    Measuring cylinder readings not very sensitive
    Subtraction produces large percentage uncertainty

[Total: 9]