# MARK SCHEME for the October/November 2013 series

## 5054 PHYSICS

**5054/42**  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.

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**1 (a) (i)** measuring force just before it jumps
reading meter and pulling magnet at same time
force varies/not constant — B1 [1]

    **(ii)** sensible suggestion, e.g.
        use of two people explained
        pull slowly
        repeat
        video newton meter — B1 [1]

**(b)** $5.5 \pm 0.1$ N unit required — B1 [1]

**(c) (i)** axes: correct way round, labelled quantity and unit (on $y$-axis only) — B1

    scales: linear, not awkward
    $x$-axis: e.g. $2\,cm \equiv 1$    $y$-axis: e.g. $2\,cm \equiv 1$ N — 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)** increasing $n$ decreases $F$
    inverse relationship — B1 [1]

**(d)** newton meter not sensitive enough
scale too big
no change/same reading
reading/force is too small (for this meter)/no force — B1 [1]

**(e) (i)** new paper/second expt (thicker) as force smaller (or reverse argument)
paper that gives 3.0 N force — B1 [1]

    **(ii)** more sensitive
    more readings
    larger values for $F$ — B1 [1]

**(f)** **yes +** aluminium non-magnetic — B1 [1]

**2 (a)** diagram showing paper and plain mirror
**plus** incident and reflected rays **OR** four roughly correct pins — B1

    2 pins placed on incident ray — B1

    pins or image (of pins) viewed in/through mirror — B1

    lines drawn **and** angles $i$ and $r$ **measured** to normal — B1 [4]

**(b)** sensible suggestion, e.g.
    view bottom of pins
    pins vertical
    pins far apart, e.g. greater than 5 cm
    repeat for different angles/repeat experiment
    sharp pencil                                                   B1  [1]

**3**  **(a)**  **(i)**  0.9 V cao (unit required)                                           B1  [1]

      **(ii)**  crocodile clips
            tight connections explained, e.g. wrap wire and tape              B1  [1]

     **(iii)**  same value/0.9 V and needle to right                       B1  [1]

  **(b)** sensible suggestion, e.g.
       e.m.f./voltage too small
       run down quickly/small amount of energy
       voltage not steady
       current too small
       resistance too large                                            B1  [1]

  **(c)**  **(i)**  **1.** 2.7 (V)  ecf 3 × **(a)(i)**                             B1  [1]
             **2.** correct wiring in series **and** connected to voltmeter    B1  [1]

      **(ii)**  **1.** 0.9 (V)  ecf = **(a)(i)**                                 B1  [1]
            **2.** correct wiring in parallel **and** connected to voltmeter  B1  [1]

**4**  **(a)** measures all ten together and divides by ten                          B1

     how stops marbles moving, e.g.
       in a groove
       between two rulers
     5 or more in a line shown touching each other                       B1

     how ends are marked, e.g.
       use of blocks
       correct use of set squares                                 B1  [3]

     **alternative methods:**
     methods of measuring one marble can score **max. 2**

     measuring all 10 and averaging                                     (B1)

     technique, e.g.
     set squares/blocks with one marble
     circumference from:
       string/paper rolled round marble then ÷ π
       ink dot on marble and roll then ÷ π                          (B1)

  **(b)**  **(i)**  16.8(0) mm / 1.68(0) cm cao (unit required)                   B1  [1]

      **(ii)**  diameter (of same marble) measured more than once in different direction(s)   B1  [1]