**PHYSICS** **5054/42**

Paper 4 Alternative to Practical **October/November 2016**

MARK SCHEME

Maximum Mark: 30

**Published**

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.

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**1** **(a)** **(i)** 64(cm$^3$)        B1

      **(ii)** reading top of meniscus instead of bottom / parallax error explained        B1

   **(b)** **(i)** balance / scales        B1

      **(ii)** find mass using tare / subtract mass of measuring cylinder from that of
measuring cylinder + liquid        B1
(density) = mass/volume        B1

   **(c)** smaller value for density        B1

                                                              **[Total: 6]**

**2** **(a)** **(i)** crocodile clips        B1

      **(ii)** (close jaws) <u>gently</u> **or** <u>use</u> ratchet / thimble / spindle **or** until wheel slips        B1
repeat at <u>different places / positions</u> (and average)        B1

     **(iii)** 0.055796(using $\pi$ button) / 0.055768(using 3.14) / 0.055818 (using 22 / 7)        C1
0.056        A1

   **(b)** **(i)** axes labelled quantity and unit **and** axes correct way round        B1
scales linear, not awkward, start from (0,0)        B1
points plotted accurately        B1
best-fit <u>straight line</u> drawn        B1

      **(ii)** large triangle or any other indication of chosen points <u>shown on graph</u>        B1
93 ± 2        B1
accept numbers rounding down to 95 and up to 91
not accept fractional values

     **(iii)** candidate's **(a)(iii)** ÷ 200×**(b)(ii)**        C1

answer correct (must be checked) <u>in standard form</u>        A1

                                                              **[Total: 13]**

**3** **(a)** orange, orange                                                                                                    B1
  brown                                                                                                               B1


  **(b)** power supply, fixed resistor and diode (any orientation) in series                      B1

   ammeter in series (with diode and resistor)                                               B1

   voltmeter across diode                                                                    B1


  **(c)** variable power supply
   add rheostat / variable resistor
   add resistor (in series) / use different values of resistor
   add cells / batteries                                                                      B1


  **(d)** reverse power supply
   reverse diode / it                                                                         B1

                                                                                        **[Total: 7]**


**4** **(a)** 27                                                                                           B1


  **(b)** **(i)** range 100–140                                                                       C1
     range 110–130                                                                        A1

   **(ii)** 4 × their **(b)(i)**                                                                B1

                                                                                        **[Total: 4]**