Density
Mark Scheme 2

Level	IGCSE
Subject	Physics
Exam Board	CIE
Topic	General Physics
Sub-Topic	Density
Paper Type	Alternative to Practical
Booklet	Mark Scheme 2

Time Allowed: 57 minutes

Score: /47

Percentage: /100

1 **(a** **(i)** h = 3.6, w = 3.4, d = 3.2 (cm)   c.a.o. [1]

  (ii) V = 39 OR 39.2 OR 39.17 OR 39.168 AND cm^3 ecf **(i)** [1]
  ρ = 2.6 OR 2.63 OR 2.64, ignore significant figures and unit,   ecf [1]

  (b) V_1 = 50 (cm^3) [1]

  (ii) V_2 = 64 (cm^3) [1]

  (iii) bottom of meniscus, direct vision [1]

  (iv) V_s = 14 (cm^3) ecf **(i)(ii)**

  (v) ρ = 2.46, 2 or 3 significant figures AND g/cm^3 ecf **(iv)** [1]

(c) **(i)** two from:
difficulty of making perfect cuboid shape   o.w.t.t.e.
measuring cylinder readings only to nearest cm^3 o.w.t.t.e.
smaller mass so greater inaccuracy
volume of thread not taken into account
air bubbles in clay / uneven density distribution / clay may absorb water / some
clay may stick to the knife [2]

  (ii) either method but with sensible matching reason [1]

[Total: 10]

2   **(a** m = 180.2(0) and unit (g)   [1]
        V_1 value = m [1]
        unit <u>cm</u>^{3} c.a.o.   [1]

    (b) V_2 = 170 c.a.o.   [1]

    (c) d_1 = 7.35 to 7.4, d_2 = 5.0 to 5.1, h = 7.9   [1]
        D = 6.2 to 6.3 allow e.c.f.   [1]
        V_3 = 239 to 246 <u>and</u> 2 or 3 significant figures only allow e.c.f.   [1]

    (d) method 2 – one from:
        some water left in cup/spilt
        measuring cylinder not read at eye level/perpendicularly/bottom of meniscus
        parallax explained   [1]

        method 3 – one from:
        d_1 not at liquid level
        d_1 and d_2 not inside diameters
        difficult to measure h (because of sloping side)
        h not measured at eye level/perpendicularly/parallax explained   [1]

    (e) mass of cup / zero reading on balance   [1]

                                                                                        [Total: 10]

3   **(a** a and b correct   2.3cm, 2.1cm   [1]

    (b) (and **(ii)** x and y correct (10a and 10b)/(23cm, 21cm)   [1]

        (iii) m correct arithmetic, in g (110/109.5(2)(g))   [1]

    (c) (and **(ii)** at least two values given for w and t [1]
                  more than two values given for w <u>or</u> t [1]
                  correct values for w and t (2.75 – 2.85cm, 0.4cm)   [1]

        (iii) V calculation correct   (110 – 114(cm^3)) or ecf   [1]

        (iv)   density to 2 or 3 significant figures   (0.960 – 1.00) or ecf   [1]
                  unit g/cm^3 [1]

    (d) centre of mass at 50cm mark/midpoint/middle (wtte)   [1]

                                                                                        [Total: 10]

4 **(a** *d* 2.5 (cm) [1]
    x 14.5 (cm) [1]
    diagram showing blocks correctly placed across the ends [1]
    rule position (or distance) shown correctly [1]

  (b) V_e 71.1 - 71.2 (cm^3) ecf allowed [1]

   (ii) measuring cylinder reading 56 (cm^3) [1

   (iii) ρ 2.05–2.08 (or 2.1) ecf allowed [1]
        g/cm^3 <u>and</u> 2 or 3 significant figures [1]

                                                      [Total: 8]

5 **(a** **(i)** cm, cm, g [1]

   (ii) 49.66 (or 49.7), 49.50 (or 49.5), 50.05 (or 50.0) [1]
        consistent significant figures (3 or 4) [1]

  (b) clear explanation/diagram [1]

  (c) correct method [1]
      value 49.7 (ignore a fourth significant figure)
        and allow ecf from **(ii)** [1]

  (d) *d* = 1.8 (cm), *t* = 1.2 (cm) [1]
      V = 3.05 (cm^3) (ecf) [1]
      ρ = 16.3 unit g/cm^3, 2/3 significant figures (ecf) [1]

                                                      [Total: 9]