

Moments/Centre of Mass

Mark Scheme 4

Level	IGCSE
Subject	Physics
Exam Board	CIE
Topic	General Physics
Sub-Topic	Moments/ Centre of Mass
Paper Type	Alternative to Practical
Booklet	Mark Scheme 4

Time Allowed: 68 minutes

Score: /56

Percentage: /100

- 1 (a) table:
 1/d values correct [1]
 0.0331, 0.0418, 0.0500, 0.0585 (0.058 to 2 sig. fig.), 0.0662 [1]
 consistent 2 or 3 significant figures
- (b) graph:
 axes labelled [1]
 scales suitable, plots occupying at least half grid [1]
 plots all correct to $\frac{1}{2}$ square (ecf) – take centre of plot if large [1]
 well judged line thin line ($\leq \frac{1}{2}$ square) [1]
 (no mark if plots $> \frac{1}{2}$ square)
- (c) triangle method used and shown (any indication on graph) [1]
 (triangle) using at least half line (can be seen in calculation) [1]
- (d) μ 27 – 33 (NO ecf) [1]
 2 or 3 significant figures and unit g [1]
- [Total: 10]**

- 2 (a) correct 1/d values 0.0222, 0.0294, 0.0370, 0.0444, 0.0518 [1]
 all to 2 significant figures or all to 3 consistent significant figures [1]
- (b) graph:
 axes suitable and labelled [1]
 all plots correct to $\frac{1}{2}$ small square [1]
 good line judgement (position) [1]
 thin line, single, no blobs (quality) [1]
- (c) gradient by triangle method using at least $\frac{1}{2}$ candidate's line [1]
 clear, on graph, how obtained [1]
- (d) z value 0.9 – 2.5 [1]
 2 or 3 significant figures and unit cm given [1]
- [Total: 10]**

- 3 (a) a and b correct 2.3cm, 2.1cm [1]
- (b) (i) 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) (i) and (ii) at least two values given for w and t [1]
 more than two values given for w or t [1]
 correct values for w and t (2.75 – 2.85cm, 0.4cm) [1]
- (iii) V calculation correct (110 – 114(cm³)) or ecf [1]
- (iv) density to 2 or 3 significant figures (0.960 – 1.00) or ecf [1]
 unit g/cm³ [1]
- (d) centre of mass at 50cm mark/midpoint/middle (wtte) [1]
- [Total: 10]**

- 4 (a) Q correct position with suitable number(s) [1]
 Rule correctly tilted, and on bench (or arrow to indicate) [1]
- (b) Any two from:
 Readings taken at either side/diameter of cylinder
 Position of mid point found
 Mark position of centre [2]
- (c) 34.5 cm [1]
- [Total: 5]**

- 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]
 $V = 3.05$ (cm³) (ecf) [1]
 $\rho = 16.3$ unit g/cm³, 2/3 significant figures (ecf) [1]

[Total: 9]

Question	Answer	Marks
6(a)	indication of taking mean reading / deducing half load length <u>and</u> adding or subtracting scale reading = 70(.0)	1 1
6(b)	F values=1.45, 2.20, 2.80, 3.55, 4.05 consistent 2 dp	1 1
6(c)	graph: <ul style="list-style-type: none"> • axes labelled with quantity and unit • appropriate scales (plots occupying at least ½ grid) • plots all correct to ½ small square • well judged straight line <u>and</u> thin line, precise plots 	1 1 1 1
6(d)(i)	y read correctly from graph	1
6(d)(ii)	W in range 1.4 to 2.0 to 2 or 3 sig fig and with unit of N	1 1
6(e)	any suitable source on inaccuracy, e.g.: <ul style="list-style-type: none"> • rule not uniform / weight not distributed evenly, • load slips on rule, • forcemeter not at zero to start, • load values not exact 	1
		Total: 12