Moments/Centre of Mass

Mark Scheme 2

Level	IGCSE
Subject	Physics
Exam Board	CIE
Topic	General Physics
Sub-Topic	Moments/ Centre of Mass
Paper Type	Alternative to Practical
Booklet	Mark Scheme 2

Time Allowed: **57 minutes**

Score: **/47**

Percentage: **/100**

1 **(a)** measure ½ mass length either side of 95.0 cm
OR mark side of mass AND rule [1]

(b) correct calculations of S, rounding to 0.17, 0.33, 0.51, 0.61, 0.80 [1]

(c) axes labelled with quantity and unit [1]
appropriate scales [1]
plots correct to ½ small square [1]
well-judged straight line, thin line, precise plots [1]

(d) **(i)** G present AND triangle method seen on graph [1]

(ii) M_R = in range 113 to 140 g AND to 2/3 sig. fig. [1]

(e) see if rule balances when pivot at 50 cm mark owtte [1]

[Total: 9]

2 **(a)(i)(ii)** x = 40 mm / 4(.0) cm AND y = 19 mm / 1.9 cm
both with correct unit [1]

(iii) 40(.0) AND 19(.0) in first line of table [1]

(b) graph:
- axes both correctly labelled, right way round and with units [1]
- suitable scales [1]
- all plots correct to within ½ small square [1]
- good best-fit line judgement, single, thin, continuous line [1]

(c) triangle method using at least half candidate's line, shown on graph [1]

G = 0.41–0.52 (2–3 sig. figs. only) [1]

(d) = 20–500 g [1]
Q = 2 × **P** (exactly) OR Q = **P**/G [1]

[Total: 10]

3 **(a** h_0 present and H_0 = 84(.0) (cm)

(b) suitable explanation,
e.g. same no. of graduations between 60 cm mark and each end of mass owtte,
or mark on <u>side</u> of rule and mass [1]

(c)(d) h present and H = 83(.0) [1]

D = 1(.0) and $d \times D$ calculations correct: 60, 75, 100, 111, 100 [1]

(e) $d \times D$ not constant / D doesn't always double when d halves owtte [1]

(f) **(i)** reference to mass/weight of rule [1]

(ii) measure height at bench [1]

subtract H_0 [1]

[Total: 8]

4 **(a** 9.7, 5.7, 2.0 (accept 2) or 97, 57, 20 [1]
<u>all</u> given to correct unit [1]
line AC drawn correctly, corner to corner [1]
α = 18 – 20° [1]

(b) number from 3 to 20 with no unit [1]

(c) correct statement for results (expect Yes) [1]
idea of within (or beyond) experimental accuracy [1]

[Total: 7]

5 **(a** 40.0 or 40(cm) [1]

(b) accuracy / reliability / check readings / spot anomaly / o.w.t.t.e. [1]

(c) correct method used [1]
30 or 30.0(g) [1]

(d) rule never quite balances, o.w.t.t.e. [1]
take average position / nearest to balance, o.w.t.t.e. [1]

[Total: 6]

6 **(a** **(i)(ii)** *M* values 112.3, 113.5 (to 3 or 4 sig. figs **only)** [1]
g at least once, not contradicted (symbols or words) [1]

(iii) 113 or 112.9 or correct average of candidate's values (ignore sig. figs) [1]

(b) 114 (g) c.a.o. [1]

(c) any two from:
centre of mass of rule not at 50.0 cm
mass X not uniform / of varying density
reference to difficulty in obtaining balance implied o.w.t.t.e.
mass of pan
mass not exactly 100 g [2

(d) one from:
mark line through the centre of the mass (can award from diagram)
use position of edges of mass on rule
[1]

[Total: 7]