Hooke's Law

Mark Scheme 2

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

Time Allowed: **57 minutes**

Score: **/47**

Percentage: **/100**

1 **(a** **(i)** and **(ii)** l_o = 2.0 and l_1 = 6.1 [1]

(iii) e_1 = 4.1cm unit required ecf from **1(a)(i)** and **1(a)(ii)** [1]

(iv) Correct calculation for k = 24/24.4 ecf from **1(a)(iii)** [1]
Unit g/cm [1]

(b) Appropriate method (can be written and/or in diagram)
e.g. measure half width of mass either side of 40 cm/mark centre of mass [1]

(ii) and **(iii)** e_2 seen and M = 190 g (no ecf) unit required for M [1]
2 or 3 significant figures [1]

(c) Any two from:
rule bends
mass not exactly at 40 cm
mass may slip
end of rule may slip
hook not directly above 0 cm
spring extension not uniform/owtte
proportional limit exceeded
mass irregular/C of G not at centre [2]

[Total: 9]

2 **(a** All labels correct: [1]
F/*W*/weight/load/Force
L//length
e/extension/x/Δ*l*/*E*
Units N, m, m only [1]

(b) Two from:
Same diameter/thickness/cross-sectional area/cross-section
Same length
(Room) temperature [2]

[Total: 4]

3 **(a** *l* / mm, *e* / mm or in words [1]

(b) 1, 3, 5, 7, 11, 17 [1]

(c) no [1]
larger loads produce bigger increases in extension OR increase between (successive) extensions not the same OR ratio W/e not the same [1]

(d) clamp, spring and weight sensibly shown [1]
ruler close to spring or with suitable horizontal pointer or equivalent [1]

[Total: 6]

4 **(a)** **(i)** l = 29 (mm) and l = 31 (mm) (allow 2.9 cm, 3.1 cm) [1
e_A = 14 (mm) and e_B = 15 (mm) (ecf) (ignore minus signs) [1]

(b) both l correct to (21.5 – 22) and 24 [1]

(ii) (6.5 – 7) and 8 (ecf) (ignore minus signs) [1]

(iii) e_{av} = 7.5 (c.a.o.) [1]

(c) statement matches readings (expect YES) (ecf NO) [1]
justification matches statement and by reference to results
(expect within limits of experimental accuracy, wtte) (too different, wtte) [1]

(d) any one of:
avoidance of parallax error explained
use of horizontal aid
measuring to same point each time
repeats
wait for springs to stop moving [1]

[Total: 8]

5 **(a)** three from:
length/diameter/number of coils of spring – any two for 1 mark each
mass of spring
selection of loads
(NOT room temperature) [3]

(b) l_o shown and l shown (consistent with l_o) [1

(c) use of fiducial aid [1]

[Total: 5]

6 **(a** view perpendicular to (or straight in front of rule)/use of set square [1]

(b) (i) correct e_1 value 3.1 and correct e_2 value 2.4 [1]
e in cm [1]

(c) density 4.43 (ecf) [1]
2/3 significant figures [1]
g/cm^3 [1]

(d) e_2 greater [1]
ρ greater (or identical to e_2 answer) (ecf) [1]

[Total: 8]

7 **(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]