(b)   (i) Range of the Spring Balance: 0.00 N to 5.00 N

(ii) Precision of Spring Balance: 0.05 N (half of the smallest division)

(c)   reading about 100 g

(d)   d = 55.0 cm

(e)   F = 2.50 N   (2.40 – 2.60 N)

(g)   Sample data:

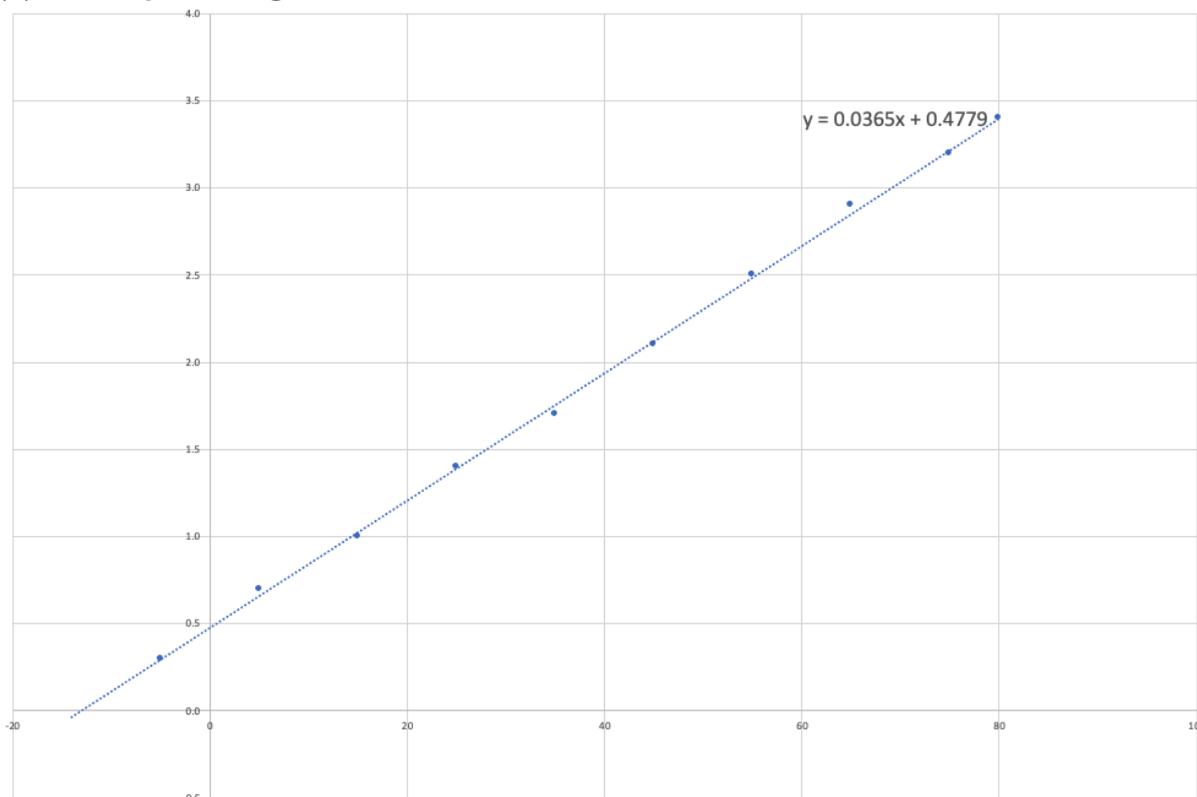| d / cm	F / N
80.0	3.40
75.0	3.20
65.0	2.90
55.0	2.50
45.0	2.10
35.0	1.70
25.0	1.40
15.0	1.00
5.0	0.70
-5.0	0.30

(h)   Graph on next page.

(i)   Gradient taken from graph.
       Large triangle and coordinates must be clearly shown on graph.
       m = 0.0365 N/cm   (0.034 – 0.038) N/cm   *(units not required)*

(j)   g = (m × 70)/0.250
          = (0.0365 × 70)/0.250   = 10.2 m s^{-2} (9 to 11 m s^{-2})

(k)   Y-intercept, *c* = 0.48 N
       M = *c* × 200
          = 0.48 × 200 = 96 g   (85 to 105 g)

(h)   **Graph of F against d**

Questions

1   Without support from the spring balance with string loop, the reading F = 0 N. From the F-d graph, this would give the x-intercept or value of d to hang the 250 g slotted mass for the ruler to be balanced.

Sample:
- d = -13.0 cm (read from graph when F = 0) ➔   15 cm + d = 2 cm mark

The 250 g mass would need to be positioned at the 2.0 cm mark on the ruler.

Note: If this value falls outside of 15 cm range, students will not able to verify this experimentally.

2

- The string to the slotted masses can be kept short to prevent the masses from swinging about.
- The ruler should not be touching the cork to avoid any friction acting on the ruler.
- The spring balance was ensured to be hanging vertically after every adjustment to d for accurate measurements during the experiment.

==Not acceptable!==

- Observe the spring balance readings at eye level to avoid parallax error (expected)
- Ruler to be placed horizontally (given in procedure)
- Ensure the 250 g mass does not touch the ground (obvious)