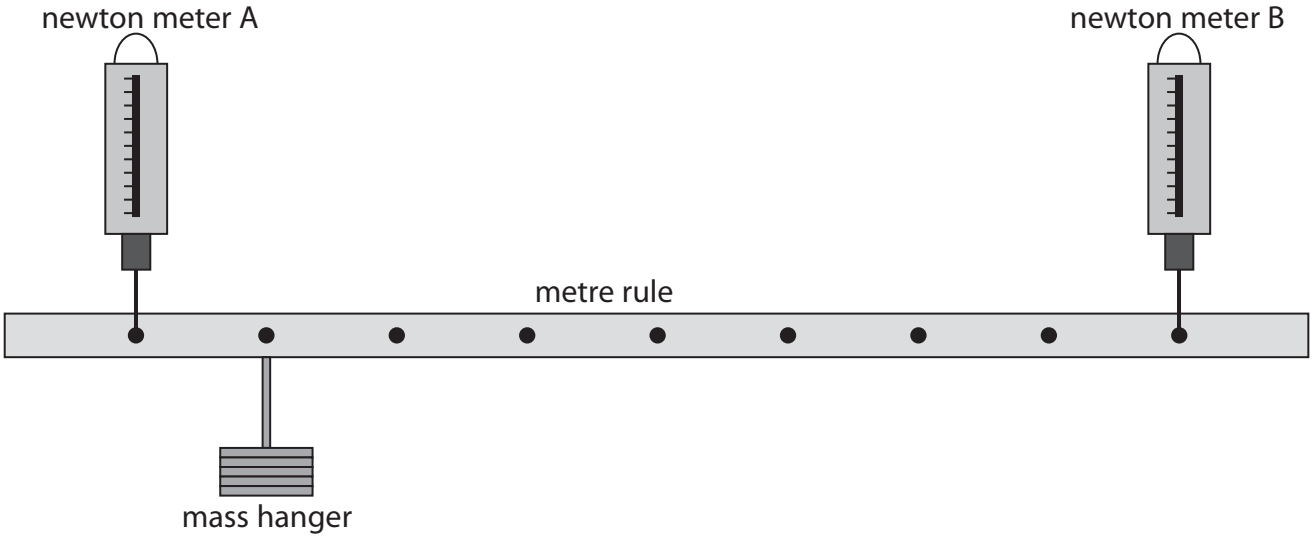
5 A student investigates how the support forces acting on a metre rule are affected by the position of a mass hanger.

He uses this apparatus.



This is the student's method.

- suspend a metre rule from its 10 cm and 90 cm marks using two newton meters
- place a mass hanger with a weight of 5 N at the 20 cm mark on the metre rule
- adjust the heights of the newton meters until the metre rule is horizontal
- record the readings on both newton meters

The student repeats the method, moving the mass hanger to a different position on the metre rule each time.

(a) (i) State the independent variable in the student's investigation.

(1)

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(ii) State two control variables in the student's investigation.

(2)

1 .....

2 .....

(iii) Suggest how the student could improve the quality of his data.

(1)

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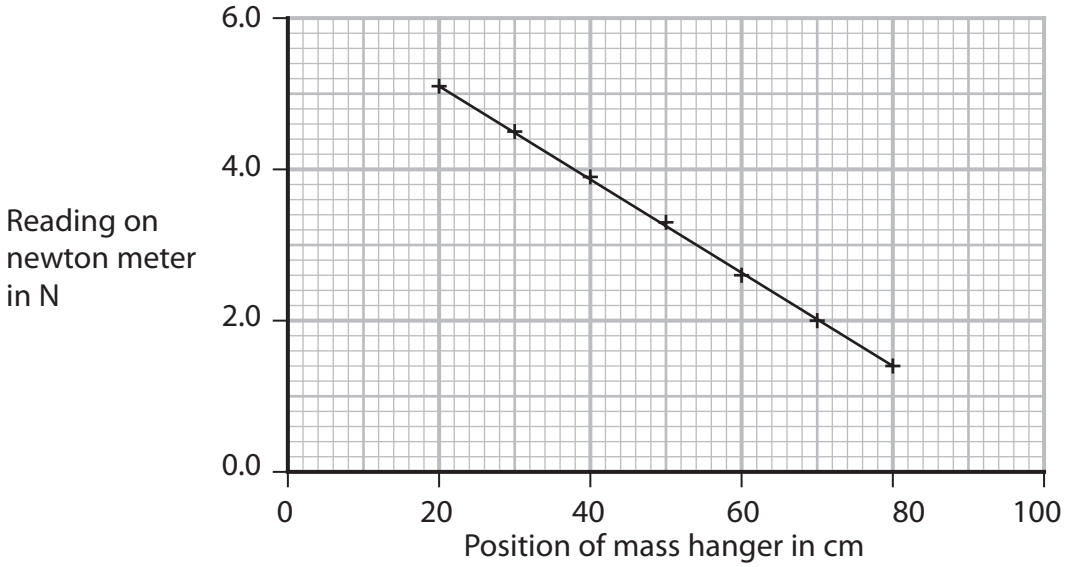
(b) The table shows the student's results.

Position of mass hanger in cm	Reading on newton meter A in N	Reading on newton meter B in N
20	5.1	1.4
30	4.5	2.0
40	3.9	2.6
50	3.3	3.3
60	2.6	3.9
70	2.0	4.5
80	1.4	5.1

The graph shows the results for newton meter A.



(i) Plot the results for newton meter B.

(1)

(ii) Draw the line of best fit for newton meter B.

(1)

(iii) Describe the relationships shown by the graph.

(4)

(c) Using ideas about moments, explain why the reading on newton meter A decreases as the mass hanger is moved towards newton meter B.

(3)

(Total for Question 5 = 13 marks)