1 A student investigates the balancing of a metre ruler.

Fig. 1.1 shows the set-up.

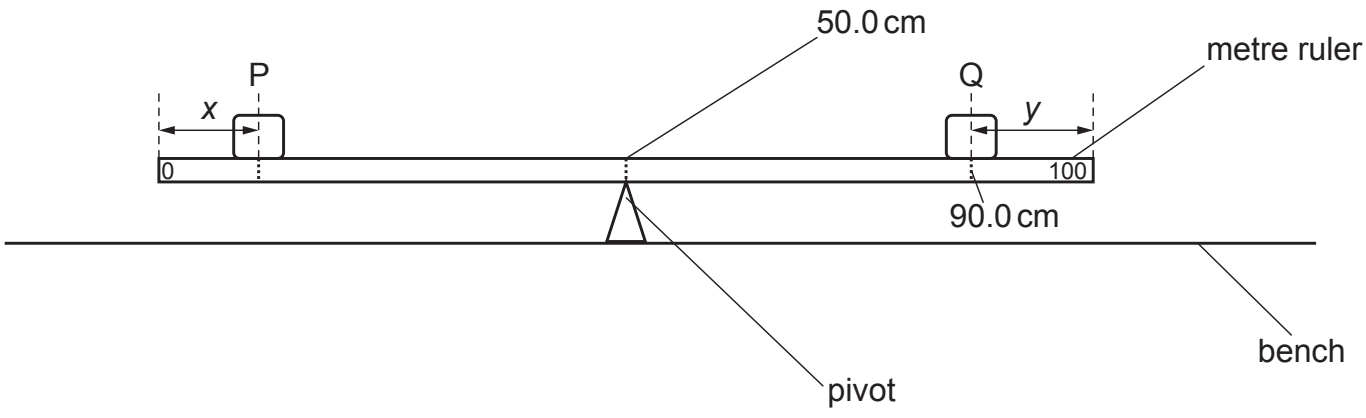

Fig. 1.1

(a) The student places the metre ruler on the pivot at the 50.0 cm mark with the scale of the ruler facing upwards.
He places an object Q with its centre on the metre ruler at the 90.0 cm mark.

Calculate the distance *y* from the centre of Q to the 100.0 cm end of the ruler.

y = ... cm [1]

(b) The student places a load P of weight *P* = 2.0 N on the metre ruler.

He adjusts the position of the load so that the metre ruler is as near as possible to being balanced. He measures the distance *x* from the centre of P to the zero end of the ruler.

He repeats the procedure using loads of weight *P* = 3.0 N, 4.0 N, 5.0 N and 6.0 N. The values of *P* and *x* are shown in Table 1.1.

Table 1.1

P / N	*x* / cm
2.0	10.2
3.0	23.1
4.0	30.0
5.0	33.8
6.0	36.8

Describe the main difficulty that a student has when doing this experiment as accurately as possible.

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.....

..... [1]

(c) Plot a graph of *P* / N (*y*-axis) against *x* / cm (*x*-axis).

Draw the best-fit line.

[4]

(d) Use the graph to find the value of *x* required to balance the ruler when *P* = 3.5 N. Show clearly on the graph how you determined the value of *x*.

x = ... [3]

(e) Using apparatus from Fig. 1.1, explain briefly how you would determine the position of the centre of mass of the ruler.

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..... [2]

[Total: 11]