

SMART EXAM RESOURCES
IGCSE PHYSICS
ATP- TOPIC QUESTIONS+MARKSCHEMES
WEIGHT OF A METER RULE

1

A student determines the weight of a metre ruler using a balancing method.

Fig. 1.1 shows the set-up.

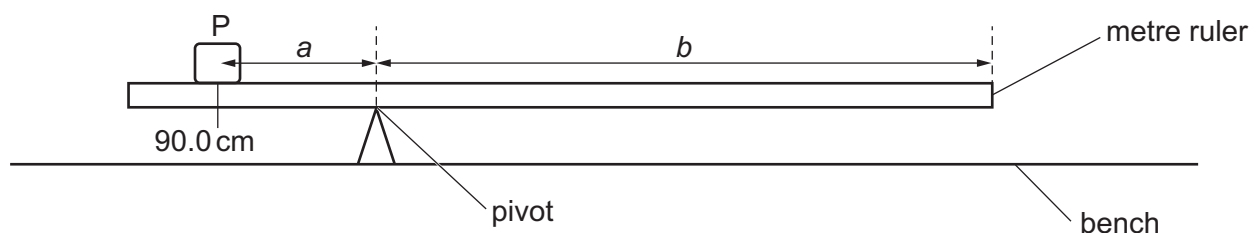


Fig. 1.1

- (a) The student places the metre ruler on the pivot. She places a load P on the metre ruler at the 90.0 cm mark. She adjusts the position of the metre ruler on the pivot so that the metre ruler is as near as possible to being balanced.

The ruler balances with the pivot at the 75.0 cm mark.

Calculate the distance a from the 90.0 cm mark to the pivot.

Record the value of a in the first row of Table 1.1.

[1]

- (b) She records, in Table 1.1, the distance b from the pivot to the 0.0 cm end of the metre ruler.

She repeats the procedure placing the load P at the 85.0 cm mark, 80.0 cm mark, 75.0 cm mark and 70.0 cm mark. She records the values of a and b in Table 1.1.

Table 1.1

a/cm	b/cm
	75.0
13.1	71.9
11.3	68.8
9.4	65.6
7.5	62.5

Plot a graph of a/cm (y -axis) against b/cm (x -axis). Start the y -axis at $a = 0.0\text{cm}$. Start the x -axis at a suitable value for the results.

Draw the best-fit line.



[4]

- (c) Determine the gradient G of the graph. Show clearly on the graph how you obtained the necessary information.

$G = \dots\dots\dots$ [2]

- (d) The weight W of the metre ruler is numerically equal to $2G$.

Calculate the weight W of the metre ruler.

$W = \dots\dots\dots$ [2]

- (e) Suggest **one** practical reason why it is difficult to obtain accurate readings for a and b .

.....
..... [1]

- (f) Using only the apparatus provided for the experiment, explain briefly how you would determine the position of the centre of mass of the metre ruler.

.....
..... [1]

[Total: 11]

MARK SCHEME:

(a)	$a = 15(.0)$	1
(b)	Graph:	
	Axes correctly labelled and right way round	1
	Suitable scales	1
	All plots correct to $\frac{1}{2}$ small square	1
	Good line judgement, thin, continuous line	1
(c)	Method shown clearly on graph	1
	Triangle using at least $\frac{1}{2}$ of candidate's line between extreme plots.	1
(d)	$W = 2G$ with unit N	1
	W in range 1.0–1.4	1
(e)	Difficult to obtain exact balance OR difficult to judge position of (centre of) load OR load / ruler may slide	1
(f)	Balance rule on pivot, balance point is at centre of mass / Find where the rule balances.	1