

- 1 (a) In the following list, underline all units that are SI base units.

ampere degree Celsius kilogram newton

[1]

- (b) Fig. 1.1 shows a horizontal beam clamped at one end with a block attached to the other end.

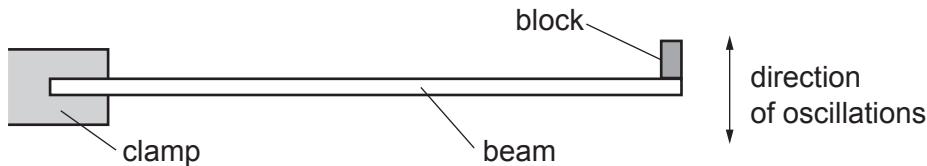


Fig. 1.1

The block is made to oscillate vertically.

The Young modulus E of the material of the beam is given by

$$E = \frac{kM}{T^2}$$

where M is the mass of the block,

T is the period of the oscillations

and k is a constant.

A student determines the values and percentage uncertainties of k , M and T .
Table 1.1 lists the percentage uncertainties.

Table 1.1

quantity	percentage uncertainty
k	$\pm 2.1\%$
M	$\pm 0.6\%$
T	$\pm 1.5\%$

The student uses the values of k , M and T to calculate the value of E as $8.245 \times 10^9 \text{ Pa}$.

- (i) Calculate the percentage uncertainty in the value of E .

$$\text{percentage uncertainty} = \dots \text{ %} [2]$$

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- (ii) Use your answer in (b)(i) to determine the value of E , with its absolute uncertainty, to an appropriate number of significant figures.

$$E = (\dots \pm \dots) \times 10^9 \text{ Pa} \quad [2]$$

[Total: 5]