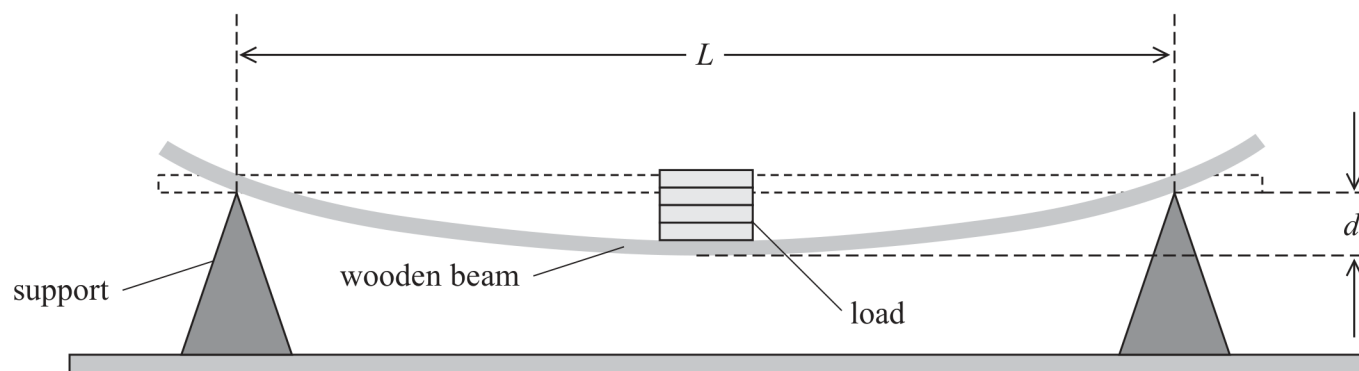


3 A student investigated the bending of a flexible wooden beam.

The student placed a load on the wooden beam. The centre of the beam was displaced by a distance d as shown.



(a) Describe an accurate method to determine a single value of d using a 15 cm ruler.

You should include any additional apparatus.

(3)

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- (b) The student varied the distance L between the supports. She used vernier calipers to measure the displacement d for a constant load.

She recorded the following data.

L / m	d / m		
0.950	0.0160		
0.850	0.0115		
0.750	0.0080		
0.650	0.0052		
0.550	0.0032		
0.450	0.0018		

- (i) Plot a graph of $\log d$ against $\log L$ on the grid opposite.

Use the additional columns for your processed data.

(6)



(ii) Determine the gradient of the graph.

(3)

Gradient =

(iii) It is suggested that for a given load, the relationship between d and L is of the form

$$d = kL^r$$

where r and k are constants.

Determine the value k from the graph and hence write the mathematical relationship between d and L .

(3)

(Total for Question 3 = 15 marks)

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