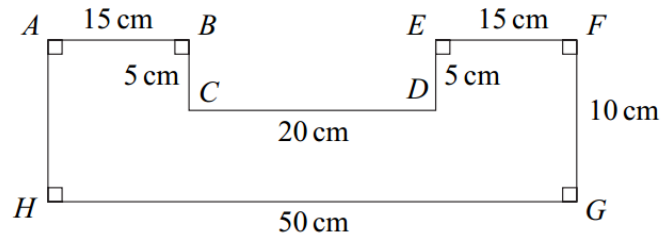


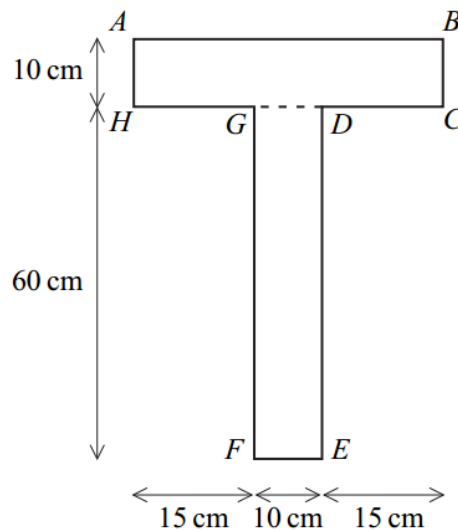
## Mechanics 2 Centre of Mass

4 The diagram shows a uniform lamina  $ABCDEFGH$ .



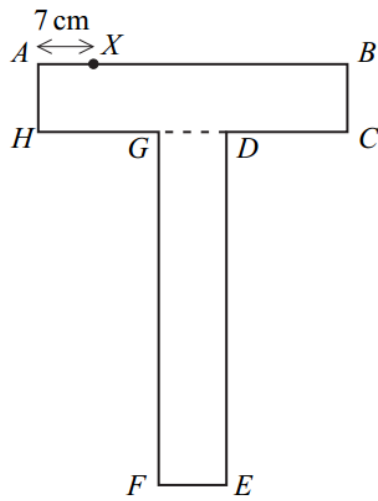
- (a) Explain why the centre of mass is 25 cm from  $AH$ . (1 mark)
- (b) Show that the centre of mass is 4.375 cm from  $HG$ . (4 marks)
- (c) The lamina is freely suspended from  $A$ . Find the angle between  $AB$  and the vertical when the lamina is in equilibrium. (4 marks)
- (d) Explain, briefly, how you have used the fact that the lamina is uniform. (1 mark)
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4 A uniform T-shaped lamina is formed by rigidly joining two rectangles  $ABCH$  and  $DEFG$ , as shown in the diagram.



- (a) Show that the centre of mass of the lamina is 26 cm from the edge  $AB$ . (4 marks)
- (b) Explain why the centre of mass of the lamina is 5 cm from the edge  $GF$ . (1 mark)

(c) The point  $X$  is on the edge  $AB$  and is 7 cm from  $A$ , as shown in the diagram below.



The lamina is freely suspended from  $X$  and hangs in equilibrium.

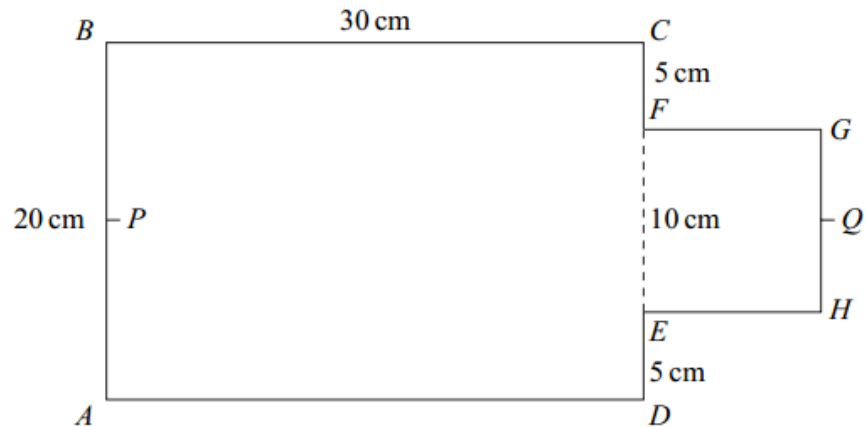
Find the angle between the edge  $AB$  and the vertical, giving your answer to the nearest degree. (4 marks)

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- 2 A uniform lamina is in the shape of a rectangle  $ABCD$  and a square  $EFGH$ , as shown in the diagram.

The length  $AB$  is 20 cm, the length  $BC$  is 30 cm, the length  $DE$  is 5 cm and the length  $EF$  is 10 cm.

The point  $P$  is the midpoint of  $AB$  and the point  $Q$  is the midpoint of  $HG$ .



- (a) Explain why the centre of mass of the lamina lies on  $PQ$ . (1 mark)
- (b) Find the distance of the centre of mass of the lamina from  $AB$ . (4 marks)
- (c) The lamina is freely suspended from  $A$ .

Find, to the nearest degree, the angle between  $AD$  and the vertical when the lamina is in equilibrium. (4 marks)

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