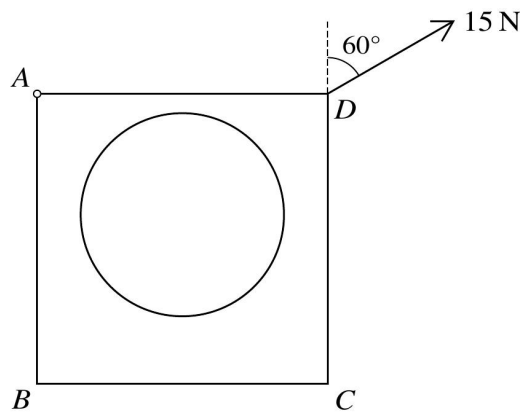


**Fig. 1**

$ABCD$  is a uniform square lamina with sides of length  $0.6\text{ m}$ . A circular hole of radius  $r\text{ m}$  is made in the lamina. The centre of the hole is  $0.3\text{ m}$  from  $AB$  and  $0.25\text{ m}$  from  $AD$ . The lamina is freely suspended at  $A$  and hangs with the axis of symmetry making an angle of  $48^\circ$  with the horizontal (see Fig. 1).

- (i) Show that  $r = 0.214$ , correct to 3 significant figures.

[5]



**Fig. 2**

The lamina is held in equilibrium with  $AD$  horizontal by a force of magnitude  $15\text{ N}$  acting in the plane of the lamina applied at  $D$ . The line of action of this force makes an angle of  $60^\circ$  with the vertical (see Fig. 2).

- (ii) Find the weight of the original square lamina, before the hole was made.

[4]

*[This page is intentionally left blank for answering the question. ]*