

Question 2 continued

A series of horizontal lines for writing the answer to Question 2.

Q2

(Total 6 marks)



- 4. A rough circular cylinder of radius $4a$ is fixed to a rough horizontal plane with its axis horizontal. A uniform rod AB , of weight W and length $6a\sqrt{3}$, rests with its lower end A on the plane and a point C of the rod against the cylinder. The vertical plane through the rod is perpendicular to the axis of the cylinder. The rod is inclined at 60° to the horizontal, as shown in Figure 1.

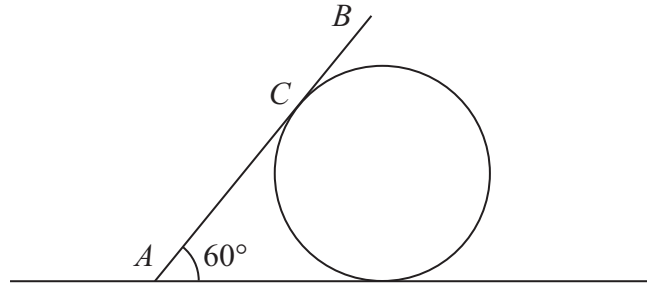


Figure 1

- (a) Show that $AC = 4a\sqrt{3}$ (2)

The coefficient of friction between the rod and the cylinder is $\frac{\sqrt{3}}{3}$ and the coefficient of friction between the rod and the plane is μ . Given that friction is limiting at both A and C ,

- (b) find the value of μ . (9)

Question 4 continued

Lined area for writing the answer to Question 4 continued.



6.

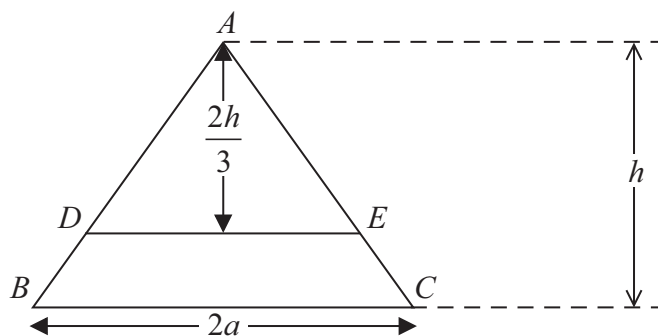


Figure 2

A uniform triangular lamina ABC of mass M is such that $AB = AC$, $BC = 2a$ and the distance of A from BC is h . A line, parallel to BC and at a distance $\frac{2h}{3}$ from A , cuts AB at D and cuts AC at E , as shown in Figure 2.

It is given that the mass of the trapezium $BCED$ is $\frac{5M}{9}$.

- (a) Show that the centre of mass of the trapezium $BCED$ is $\frac{7h}{45}$ from BC . (5)

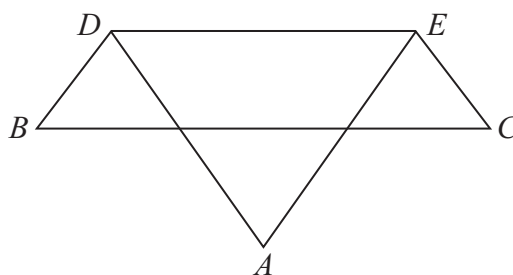


Figure 3

The portion ADE of the lamina is folded through 180° about DE to form the folded lamina shown in Figure 3.

- (b) Find the distance of the centre of mass of the folded lamina from BC . (4)

The folded lamina is freely suspended from D and hangs in equilibrium. The angle between DE and the downward vertical is α .

- (c) Find $\tan \alpha$ in terms of a and h . (4)



Question 7 continued

(This area contains numerous horizontal lines for writing.)



Question 7 continued

Blank lined area for student response.

Leave blank

Q7

(Total 16 marks)

TOTAL FOR PAPER: 75 MARKS

END



BLANK PAGE



BLANK PAGE

