5.

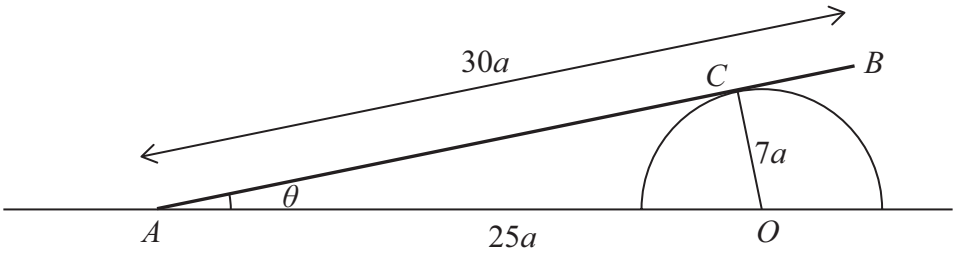


Figure 3

A smooth solid hemisphere is fixed with its plane face in contact with rough horizontal ground. The hemisphere has centre O and radius $7a$

A uniform rod AB, of length $30a$ and weight W, rests in limiting equilibrium on the hemisphere with end A on the ground. The rod is in contact with the hemisphere at the point C. The rod is at an angle θ to the ground, as shown in Figure 3.

Points A, C, B and O all lie in the same vertical plane.

Given that $AO = 25a$

(a) show that $AC = 24a$

(1)

(b) Show that the magnitude of the normal reaction on the rod at C is $\frac{3}{5}W$

(3)

The coefficient of friction between the rod and the ground at A is μ

(c) Find the value of μ

(6)

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Question 5 continued

(Total for Question 5 is 10 marks)