**4.**

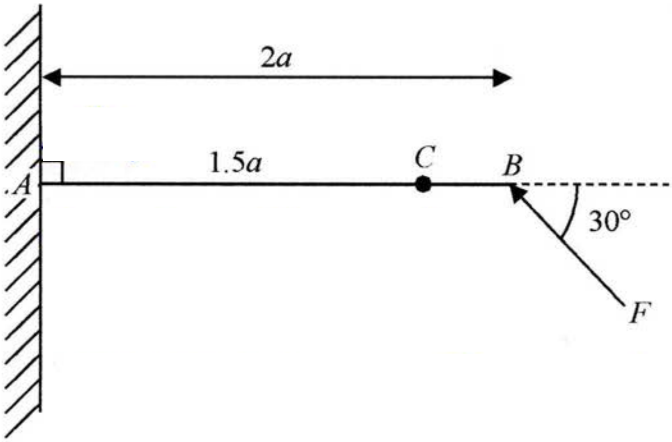


**Figure 2**

A uniform rod $AB$ has mass $m$ and length $2a$.
A particle of mass $2m$ is attached to the rod at the point $C$, where $AC = 1.5a$
The rod is freely hinged at its end $A$ to a fixed vertical wall.
The rod is held in equilibrium in a horizontal position by a force applied to its end $B$.
The force has magnitude $F$ and acts at 30° to the horizontal, as shown in Figure 2.

The line of action of the force and the rod lie in the same vertical plane that is perpendicular to the wall.

(a) Show that $F = 4mg$

(3)

(b) Find the magnitude, in terms of $m$ and $g$, of the vertical component of the force exerted on the rod by the wall at $A$.

(2)

The line of action of the force exerted on the rod by the wall at $A$ makes an angle $\theta$ with the horizontal.

(c) Find the exact value of $\tan\theta$.

(4)