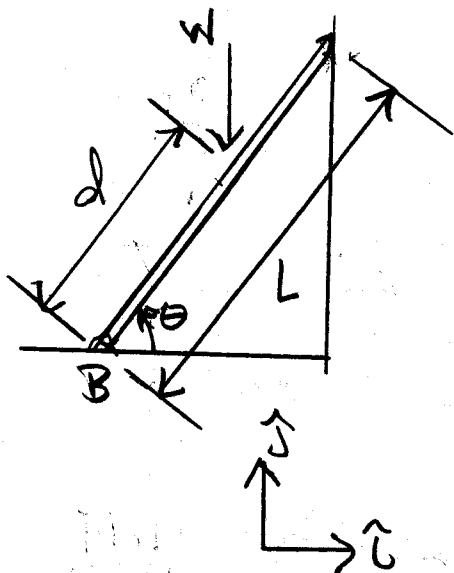


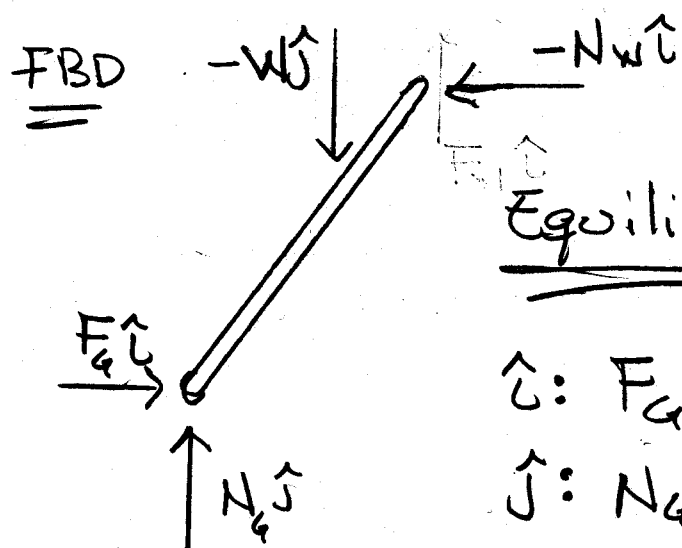


Given: L, d, θ, W

Find: Reaction Forces on ladder

Assume: • Neglect the weight of the ladder itself

• Neglect friction @ Wall



Equilibrium $\sum \vec{F} = \vec{0}, \sum \vec{M} = \vec{0}$

$$\hat{i}: F_q - N_w = 0 \quad (1)$$

$$\hat{j}: N_q - W = 0 \quad (2)$$

$$(\hat{k}): -Wd \cos(\theta) + N_w L \sin(\theta) = 0 \quad (3)$$

3 equations for 3 unknowns: N_q, F_q, N_w

Solve

$$(2) \Rightarrow \boxed{N_q = W}$$

$$(3) \Rightarrow N_w = \frac{Wd \cos(\theta)}{L \sin(\theta)} = \boxed{\frac{Wd}{L \tan(\theta)} = N_w}$$

$$(1) \Rightarrow F_q = N_w \Rightarrow \boxed{F_q = \frac{Wd}{L \tan(\theta)}}$$

Newton's 2nd law

$$\sum \vec{F} = m\vec{a} \text{ (statics)}$$

Unknowns: N_F, F_F, N_W, F_W 3

Equations: 3

Statically
~~indeterminant~~
determinant

$$\text{Euler: } \sum \vec{M}_P = I_G \vec{\alpha} = \vec{0}$$

NML