

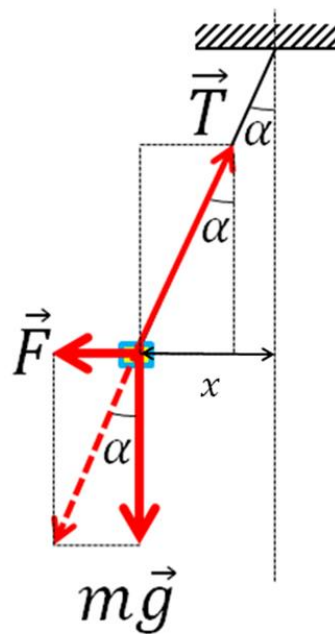
Answer on Question #79389, Physics / Mechanics | Relativity

Question. A 2100 kg of a rectangular box is suspended from a height of 15 m. What is the minimum force required to displace a hanging object at a particular degree?

Given. $m = 2100 \text{ kg}$; $l = 15 \text{ m}$.

Find. $F = f(x)$.

Solution



For small angles

$$F = T \sin \alpha$$

$$mg = T \cos \alpha$$

We have

$$\frac{F}{mg} = \frac{\sin \alpha}{\cos \alpha} \rightarrow \frac{F}{mg} = \tan \alpha \rightarrow F = mg \tan \alpha \approx mg \sin \alpha = mg \frac{x}{l} = 2100 \cdot 9.8 \cdot \frac{x}{15} = 1372 \cdot x$$

If $\alpha = 1^\circ = 0.0174 \text{ rad}$ then $x = 0.0174 \cdot 15 = 0.262 \text{ m}$ and

$$F = 1372 \cdot 0.262 = 359 \text{ N}$$

Answer. $F = mg \frac{x}{l} = 1372 \cdot x$.

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