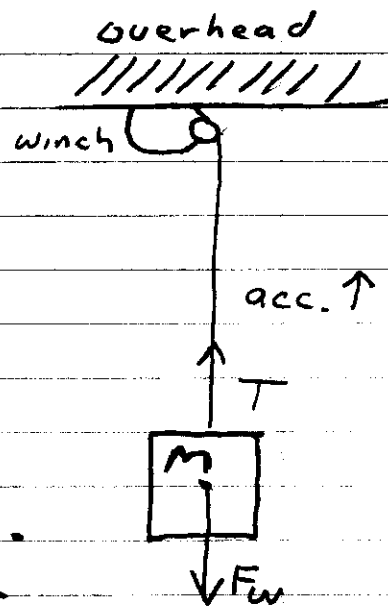


20080228_1515

A cable will break when its Tension exceeds 2000 N.

On Earth, how much mass can this cable accelerate upward at a rate of 6.200 m/s^2 ?

Solution: The cable must be strong enough to both support the weight of the object and to cause the upward acceleration. For this cable $T = 2000 \text{ Newtons}$.



$$\text{Tension} = F_{\text{support}} + F_{\text{accelerate}}$$

$$2000 \text{ N} = (m)(9.8 \frac{\text{m}}{\text{s}^2}) + (m)(6.2 \frac{\text{m}}{\text{s}^2})$$

$$2000 \text{ N} = (m)(9.8 \frac{\text{m}}{\text{s}^2} + 6.2 \frac{\text{m}}{\text{s}^2})$$

$$2000 \text{ N} = (m)(16.0 \frac{\text{m}}{\text{s}^2})$$

$$m = \frac{2000 \text{ N}}{16 \frac{\text{m}}{\text{s}^2}} = \frac{1000 \text{ kg} \frac{\text{m}}{\text{s}^2}}{8 \frac{\text{m}}{\text{s}^2}} = \frac{500 \text{ kg}}{4}$$

$$m = \frac{250 \text{ kg}}{2} = 125 \text{ kg}$$

max. mass = 125 kilograms

Note: There is no margin for error here.