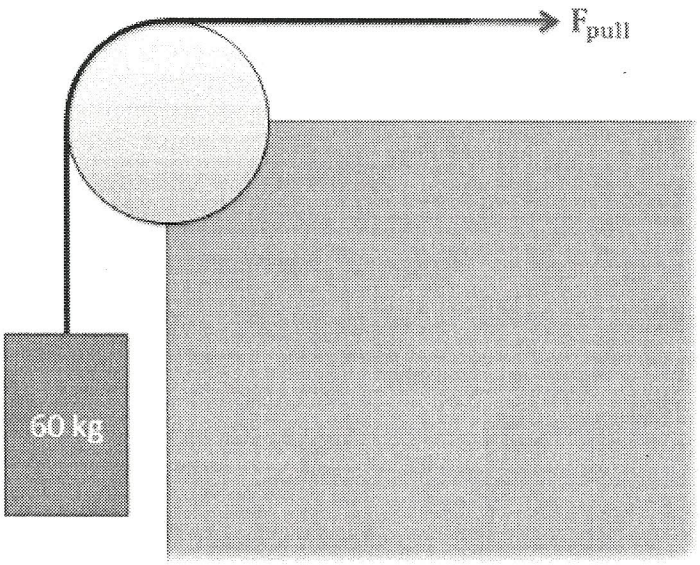
Question 1:

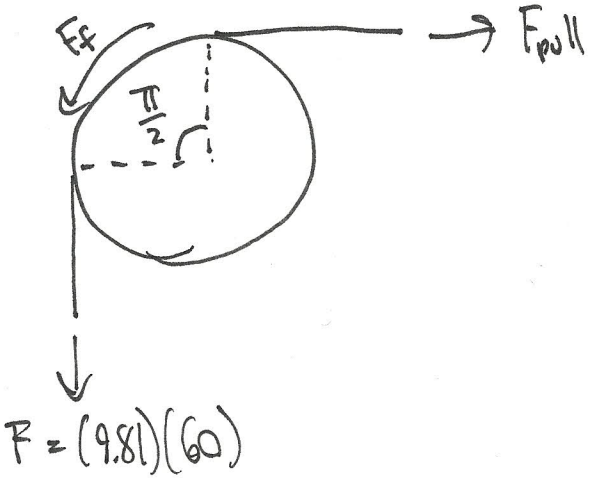
A steel cable supports a 60 kg mass and is then run a quarter of the way around a steel cylinder and supported by a pulling force as shown in the diagram below. The static coefficient of friction between the cable and the steel cylinder is .3.

a • What is the minimum pulling force required to lift the mass?

b • What is the minimum pulling force required to keep the mass from falling?



a

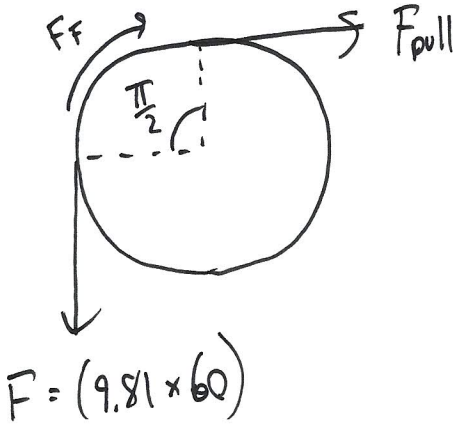


$$T_{2\,max} = T_1 e^{\mu_s \beta}$$

$$F_{pull} = (9.81 \times 60)_N \, e^{(.3)\left(\frac{\pi}{2}\right)}$$

$F_{pull} = 942.9$ N to lift

b)



$$T_{2\,max} = T_1 e^{\mu_s \beta}$$

$$(9.81 \times 60) = F_{pull}\, e^{(.3)\left(\frac{\pi}{2}\right)}$$

$F_{pull} = 367.4\ N$

to keep from falling