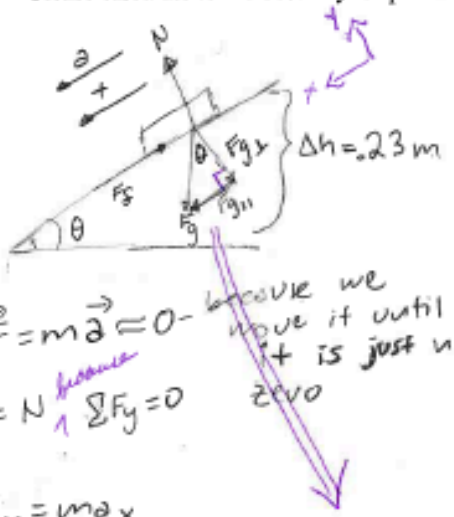
Big Exam #7:

Please calculate to the best of your precision, the coefficient of friction.



$\sin^{-1}\left(\frac{.23m}{.4m}\right) = \theta = 35°$

mass doesn't matter, why not though?
maybe because it cancels because N force = Fg (YES IT DOES CANCEL)

because we move it until it is just not zero

$\sum \vec{F} = m\vec{a} = 0$

$F_{g\perp} = N$ because $\sum F_y = 0$

Dynamics sense because we are looking at forces that cause acceleration

$\sum F_x = ma_x$

$-F_f + F_{||} = ma_x = 0$

.4m

$F_{g||} = F_f$

$F_{g||} = N\mu = F_{g\perp}(\mu)$

$mg\sin\theta = mg\cos\theta(\mu)$

$\mu = \tan 35°$

$\mu = .7$

this makes sense because it took a high Δh for the mass to fall down the incline plane, so there must be a high coefficient of friction to keep the from sliding down

$\sin 35 = \frac{F_{g||}}{F_g}$

$F_g \sin 35 = F_{g||}$

$F_g = mg$

$F_{g||} = mg\sin 35$

$F_g \cos 35 = F_{g\perp}$

$mg\cos 35 = F_{g\perp}$

A! (5)

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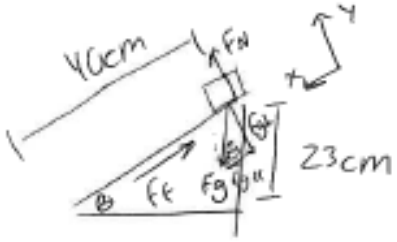

$\sin\theta = \frac{23cm}{40cm}$

$\theta = \sin^{-1}\left(\frac{23}{40}\right)$

$\theta \approx 35°$

$\cos 35 = \frac{F_{g\perp}}{F_g}$

$F_\perp = F_g \cos\theta$

lens. dynamics, forces cause acceleration

$F_f = \mu F_N \cos\theta$

$\sum F = ma$

$\sum F_y = ma_y = 0$

$N = F_\perp$ $F_N = F_{gy}$

$F_N = mg\cos\theta$

$\sum F_x = ma_x$

$-F_f + F_\parallel \pm ma_x = 0$

$F_\parallel = F_f$ $F_{gx} = F_f$

$\sin 35 = \frac{F_{g\parallel}}{F_g}$

$F_{g\parallel} = F_g \sin 35$

$F_f = mg\sin\theta$

$mg\sin\theta = \mu mg\cos\theta$

$\mu = \frac{mg\sin\theta}{mg\cos\theta}$

$\mu = \tan\theta$

$\mu = \tan 35°$

$\boxed{\mu = 0.7}$