01·20·09

SOL RE: MACHINE EFFICIENCY

$$\frac{34j}{48j} \cdot \frac{x}{100}$$

$$x = 7083\%$$

$$\frac{48x}{48} = \frac{3400}{48}$$

$$\eta \rightarrow e = \left[\frac{W_{\text{ORK OUT}}}{E_{\text{NERGY IN}}}\right] 100\% = \left(\frac{34\,J}{48\,J}\right) 100\% \cong 71.\%$$

∴ ~29% of ENERGY IN → HEAT LOSSES DUE TO FRICTION

SOL 1·20·09

$$E = \frac{W_{out}}{W_{in}} = \frac{34}{48}(100\%) = 70.8\%$$

W_{in} = TOTAL ENERGY IN

η_e

$\therefore$ 29% of ENERGY IN → HEAT LOST DUE TO FRICTION

COEFFICIENT of FRICTION → mu → μ

μ is also used as a metric prefix → e.g. μm → μ = micro = 10^{-6}

$$\mu = \frac{F_f}{F_N}$$ F_f FRICTION FORCE, F_N NORMAL FORCE

$$\mu_s = \frac{F_f}{F_N} = \mu_D$$ (μ_s STATIC, μ_D DYNAMIC)

F_N is usually = Weight of OBJECT ("mg")

WE CAN SAY IN GENERAL

$$\mu_s > \mu_D$$

$$F_f \leq \mu_s F_N$$ STATIC CASE

$$F_f = \mu_D F_N$$ DYNAMIC CASE

DEMO w/ THE PULLING of SLED w/ 3 WEIGHTS.

$F_N = 8.4\,N$, $F_f = 1.2\,N$ → $\mu = \frac{F_f}{F_N} = 0.14$