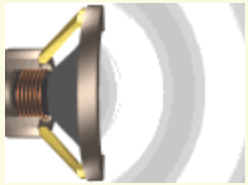
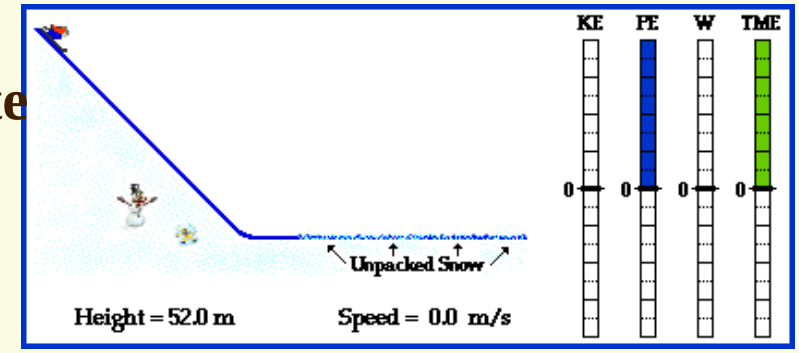
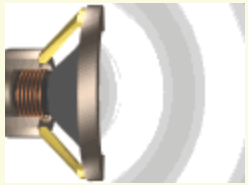


Aula 5: Energia

1. Lei do trabalho – energia
2. Trabalho de uma força constante
3. Trabalho de uma força variável
4. Energia potencial
5. Lei de conservação da energia

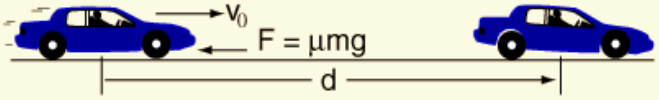


Simulação: produto escalar



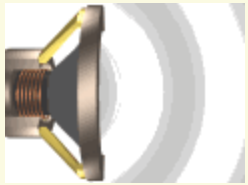
1. Trabalho e energia cinética

2ª lei ➔ $\frac{mv_f^2}{2} - \frac{mv_i^2}{2} = \sum_k (\pm F_{ak})s = \sum_k (\pm W_k) = W$

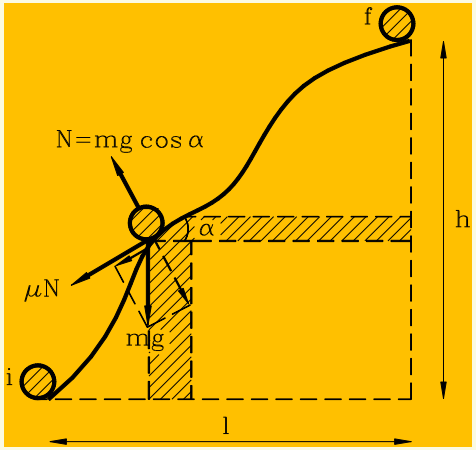


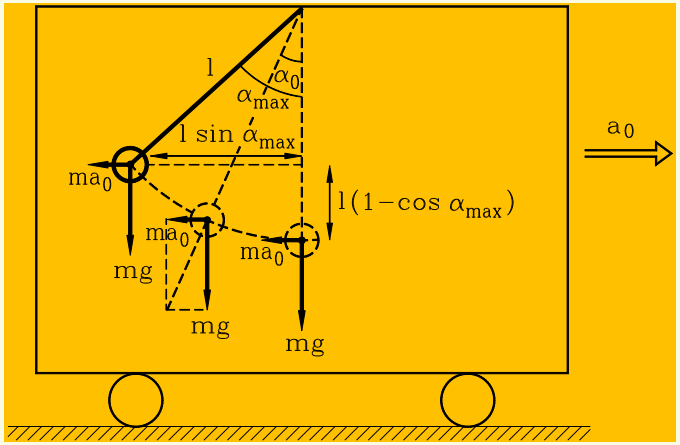
Trabalho $W = \vec{F} \cdot \vec{s}$

Energia cinética $K = \frac{1}{2}mv^2$

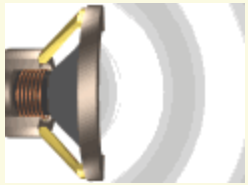


2. Trabalho de uma força constante

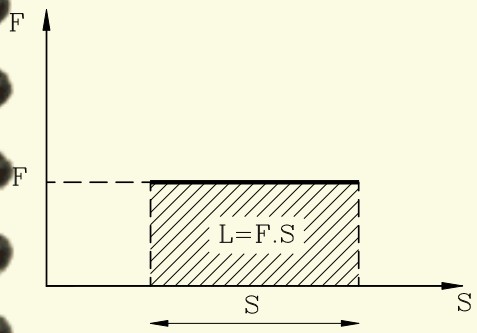


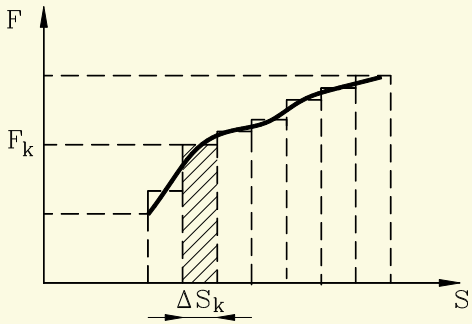


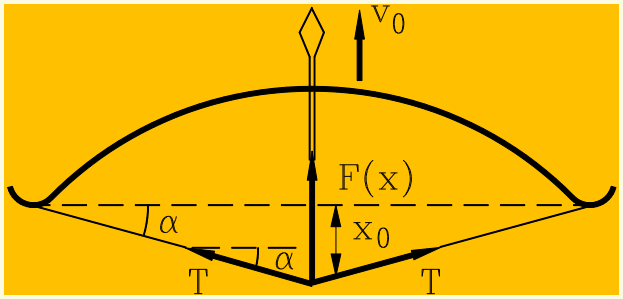
Simulação: trabalho de forças variáveis

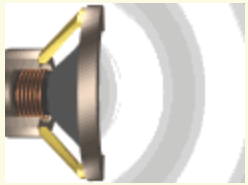


3. Trabalho de uma força variável





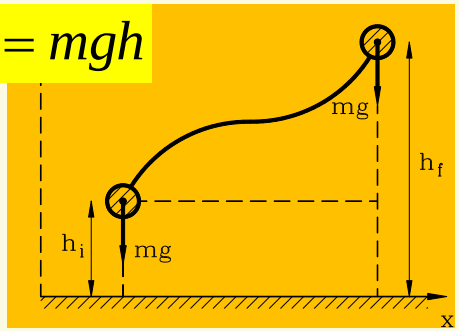




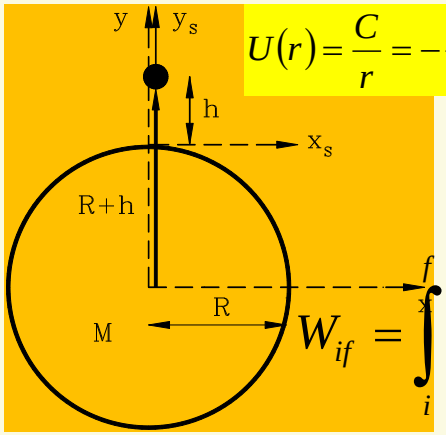
4. Energia potencial

$$W_{if} = (-mg)(h_f - h_i) = mgh_i - mgh_f = U_i - U_f$$

$$U(h) = mgh$$



$$U(r) = \frac{C}{r} = -\frac{\gamma mM}{r}$$

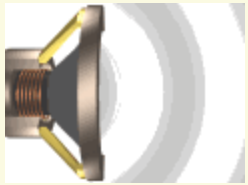


$$f(r) = -\gamma \frac{mM}{r^2} = \frac{C}{r^2}$$

$$W_{if} = \int_i^f \frac{C}{r^2} dr = \frac{C}{r_i} - \frac{C}{r_f} = U_i - U_f$$

Simulação: energia potencial

Simulação: conservação da energia



5. Lei de conservação da energia

$$E = K + U$$

$$\left(\frac{mv_f^2}{2} + U_f\right) - \left(\frac{mv_i^2}{2} + U_i\right) = W_n$$

Energia mecânica total: animação

Movimento de uma esfera: animação