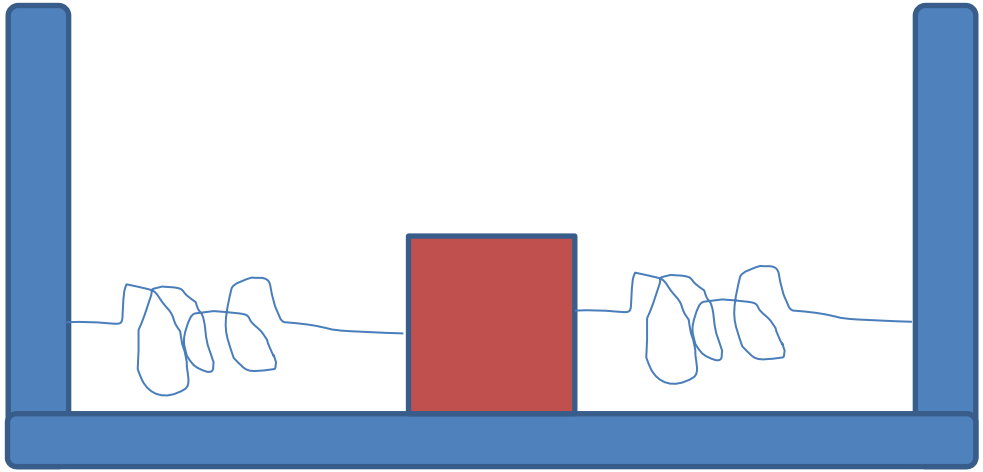
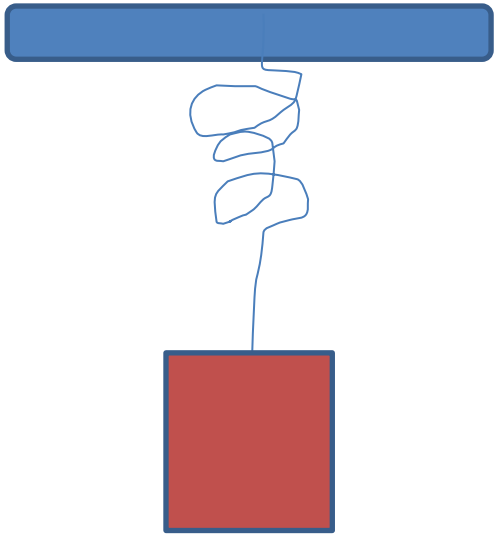
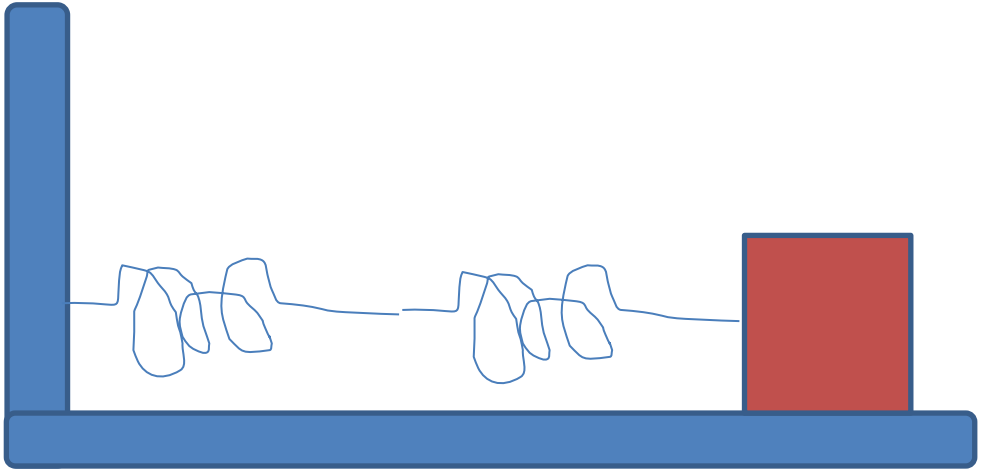
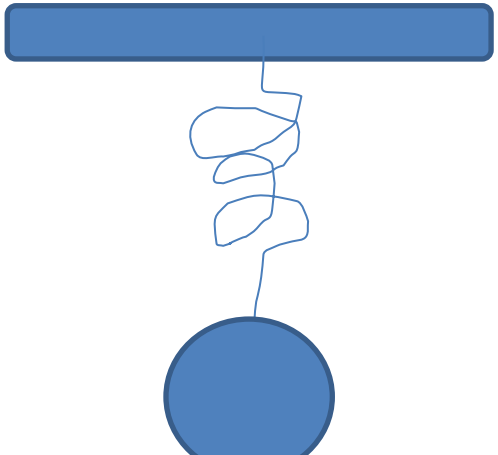
Projeto massa-mola



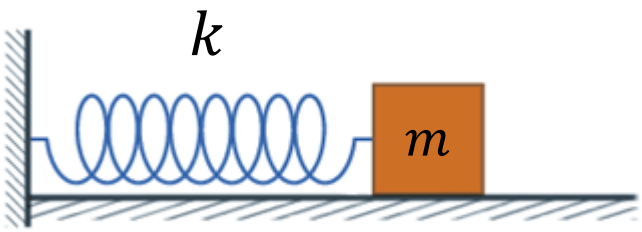






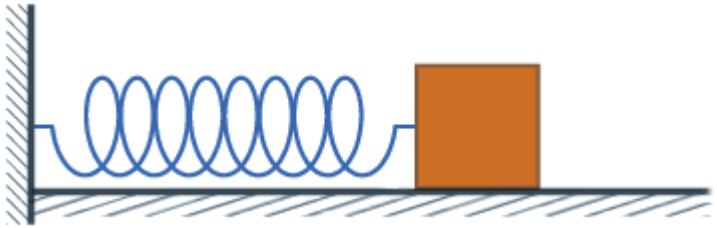
Movimento harmônico simples

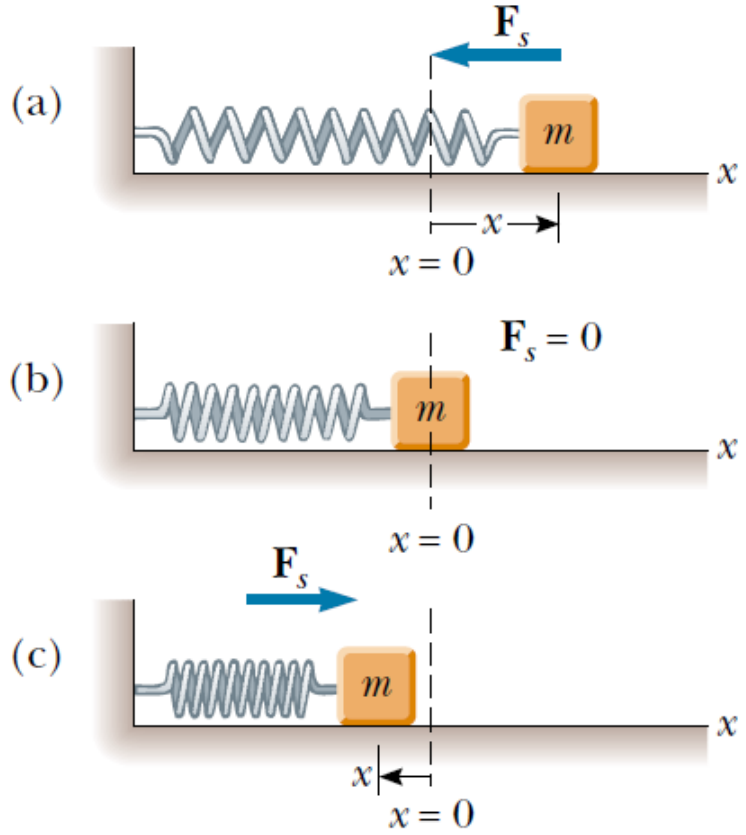
Corpo preso a uma mola



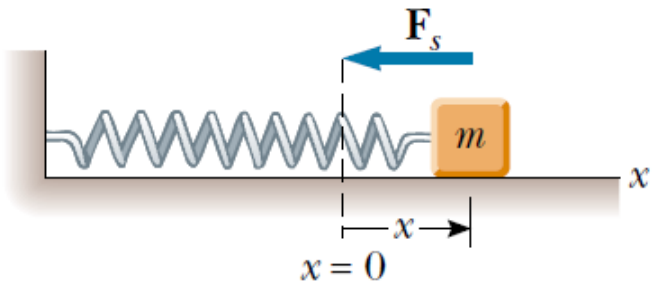
k é a constante da mola;

m é a massa do objeto





Lei de força e a equação de movimento



$$F_s(x) = -kx$$

F_s é uma força restauradoura

Para a 2ª Lei de Newton

$$F_r = ma$$

$$ma = -kx \Longrightarrow a = -\frac{k}{m}x$$

Velocidade e posição

$$v = v_0 + at$$

$$x = x_0 + vt$$

Energia do MHS

Energia cinética

$$k_c(t) = \frac{1}{2}mv^2(t)$$

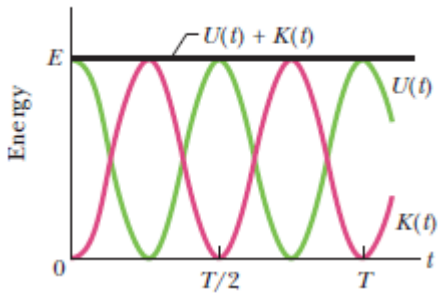
Energia potencial elástica

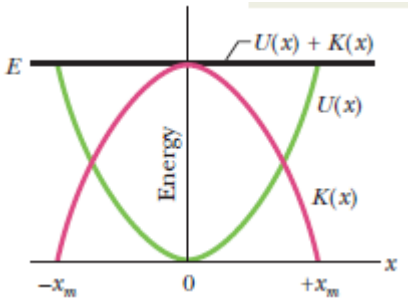
$$U(t) = \frac{1}{2}kx^2(t)$$

Energia mecânica

$$E = k_c(t) + U(t)$$

$$E = \frac{1}{2}kx_m^2$$



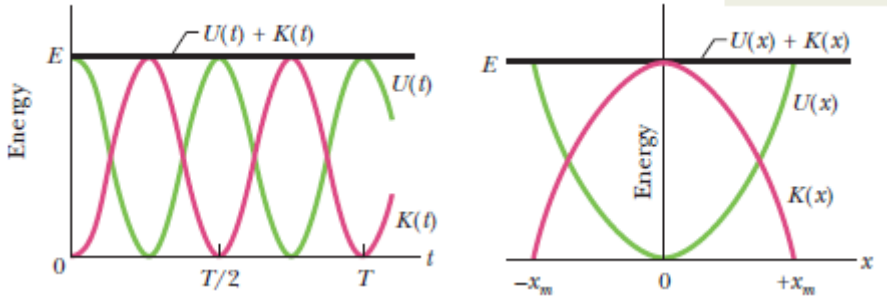


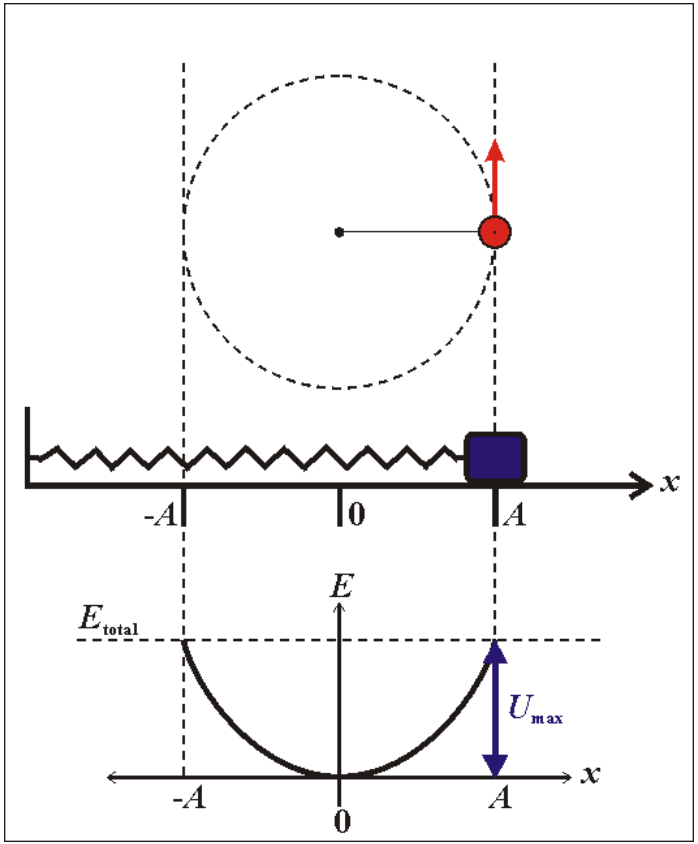
Energia do MHS

Energia mecânica

$$E = k_c(t) + U(t)$$

$$E = \frac{1}{2}kx_m^2$$





2.2 Deslocamento, velocidade e aceleração

Velocidade

$$v(t) = -v_m \text{sen}(\omega t + \phi)$$

$v_m = \omega x_m$ - amplitude de velocidade;

Aceleração

$$a(t) = -a_m \cos(\omega t + \phi)$$

$a_m = \omega^2 x_m$ - amplitude de aceleração;