2.3

$F = kx$

Ansätt $E = Ck^{\alpha}x^{\beta}$ C okänd konstant med dimensionen 1 (dimensionslös)

$\dim(C) = 1$

$k = \frac{F}{x}$

$$\dim(k) = \dim\left(\frac{F}{x}\right) = \frac{\dim(F)}{\dim(x)} = \frac{\dim(ma)}{\dim(x)} = \frac{\dim(m)\cdot\dim(a)}{\dim(x)} =$$

$$= \frac{\dim(m)\cdot\dim(l/t^2)}{\dim(x)} = \frac{\dim(m)\cdot\dim(l)}{\dim(t^2)\cdot\dim(x)} = \frac{\dim(m)\cdot\dim(l)}{(\dim(t))^2\cdot\dim(x)} =$$

$$= \frac{ML}{T^2\cdot L} = MT^{-2}$$

$$\dim(E) = \dim(mgh) = \dim(m)\dim(g)\cdot\dim(h) = M(LT^{-2})L = ML^2T^{-2}$$

Alt. $\dim(E) = \dim(mv^2) = \dim(m)\cdot(\dim v)^2 = M(LT^{-1})^2 = ML^2T^{-2}$

$$\dim(E) = \dim(Ck^{\alpha}x^{\beta}) = \underbrace{\dim(C)}_{1}\cdot\underbrace{(\dim k)^{\alpha}}_{MT^{-2}}\cdot\underbrace{(\dim x)^{\beta}}_{L} =$$

$$= 1(MT^{-2})^{\alpha}L^{\beta} = M^{\alpha}L^{\beta}T^{-2\alpha} = ML^2T^{-2}$$

M: $\alpha = 1$

L: $\beta = 2$

T: $-2\alpha = -2 \Rightarrow \alpha = 1$ (stämmer)

$\therefore \boxed{E = CkX^2}$ C obekant (i själva verket $C = \frac{1}{2}$)

GK.