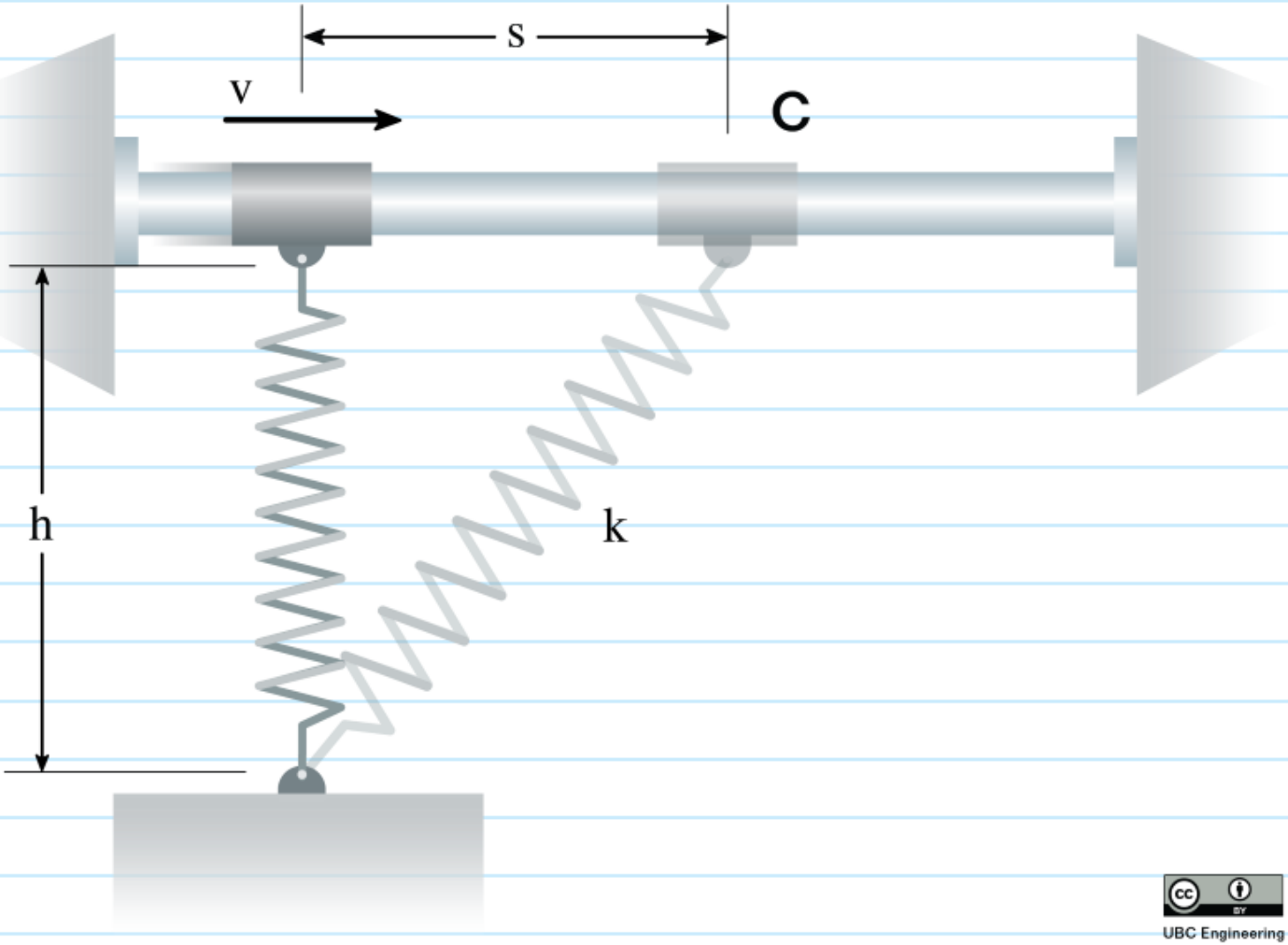
21-P-WE-GD-018



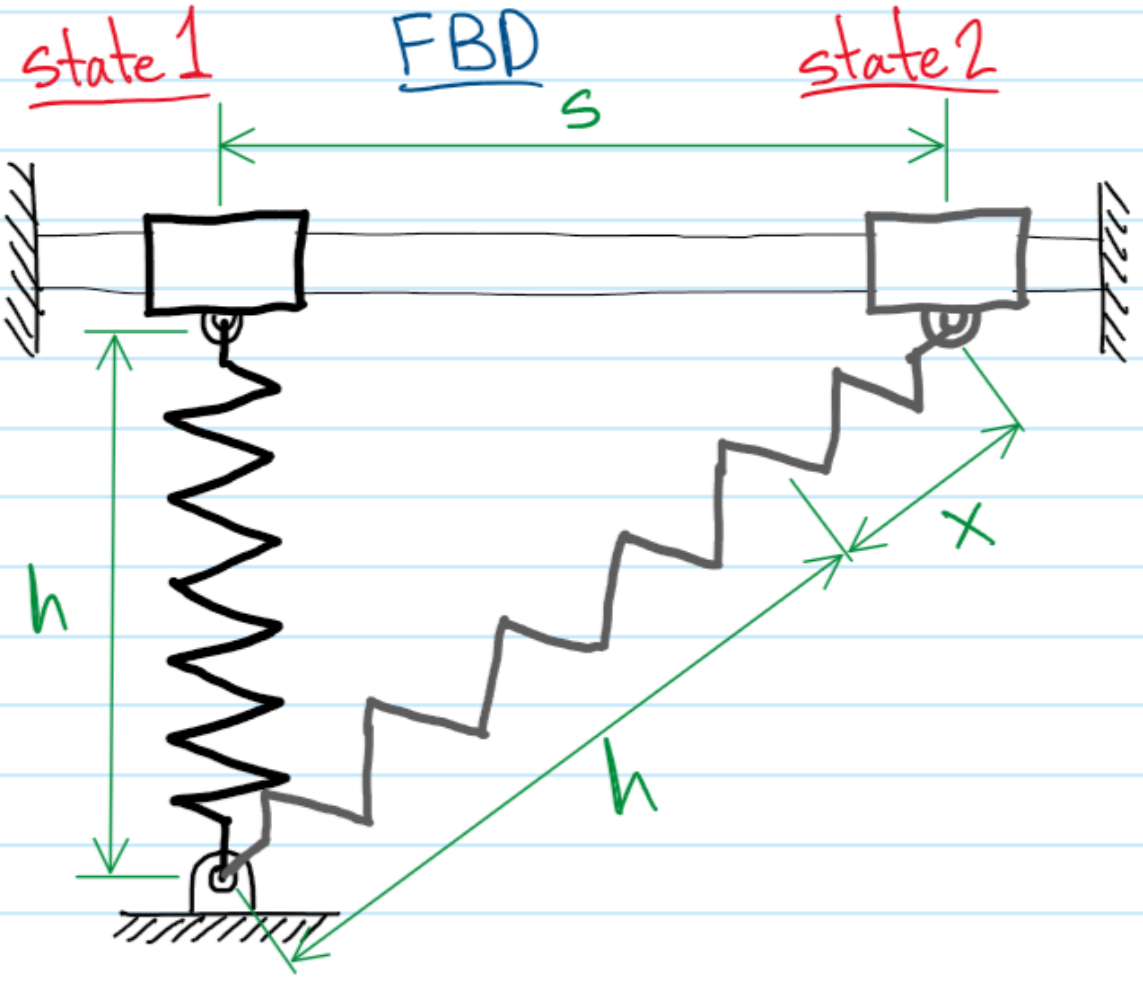
The m kg smooth collar C fits on the horizontal shaft as shown. If the spring has an unstretched length of $h = h$ m and the collar starts with an initial velocity of $v = v$ m/s, how far does the spring stretch and the collar slide before coming to rest?

(Assume $K = K$ N/m)

(Assume $K = \underset{\equiv}{K}$ N/m)

given
m, h, v, K

find
x, s



bar is horizontal
↳ no effect of gravity / 2nd state is at rest

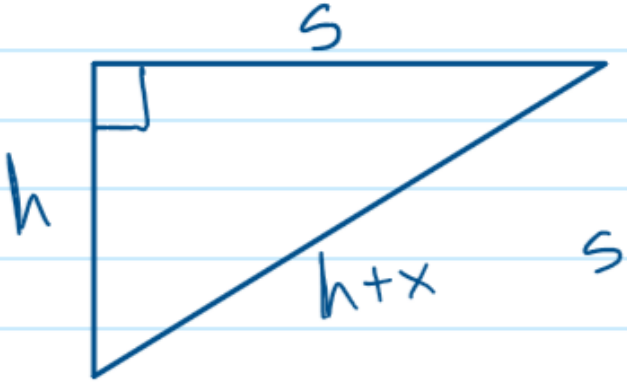
Conservation of Energy

$T_1 + V_1 = T_2 + V_2$

$\frac{1}{2} m v_1^2 = \frac{1}{2} K x^2$

find x

$x = \sqrt{\frac{m v_1^2}{K}}$



$s = \sqrt{(h+x)^2 - h^2}$

$s = \sqrt{(h+x)^2 - h^2}$