Daanish Khan

9) $U_s + U_g = \frac{1}{2}mv^2$

$\frac{1}{2}kx^2 + mgh = \frac{1}{2}mv^2$

x = displacement of ball
ℓ = length compressed

Projectile Motion

9) $x = v_{0x}t$

$\Delta y = v_{0y}t + \frac{1}{2}a_y t^2 \rightarrow a_y = g \rightarrow h = \frac{1}{2}gt^2$

$\rightarrow v_{0y} = 0 \nearrow t = \sqrt{2hg}$

$x = v_{0x}\sqrt{2hg}$

$x_1 = 1.93m$ → actual distance

$x_2 = 2.2m$ → wanted distance

$v_{01}$ = actual velocity

$v_{02}$ = wanted velocity

$\frac{1.93}{2.2} = \frac{v_{01}}{v_{02}}$ $\quad v_{02} = \left(\frac{2.2}{1.93}\right)v_{01}$

$E_i = E_f$

$\frac{1}{2}k\ell^2 = \frac{1}{2}mv^2 \rightarrow k\ell^2 = mv^2$ → v is proportional to ℓ

$\ell_1$ = actual length = .11m

$\ell_2$ = wanted length

$\ell_2 = \left(\frac{2.2}{1.93}\right)\ell_1$

$\ell_2 = .11\left(\frac{2.2}{1.93}\right) = .1254m = 12.54cm$