3. $m = 3.5\ kg$

$l = 1.80\ m$

$\theta_{max} = 10^\circ = .1745$ radians

$$T = 2\pi\sqrt{\frac{l}{g}} = 2\pi\sqrt{\frac{1.8}{9.8}} = 2.69\ s$$ (a)

$$E = mgl(1 - \cos\theta_{max})$$

$$(3.5)(9.8)(1.8)(1 - \cos(.1745)) = .938\ \text{Joules}$$ (b)

spring same period

$$T = 2\pi\sqrt{\frac{m}{k}} \qquad k = m\left(\frac{2\pi}{T}\right)^2 = (3.5)\left(\frac{2\pi}{2.69}\right)^2 = 19.1\ N/m$$ (c)

spring same energy

$$E = \tfrac{1}{2}kA^2 \qquad .938 = \tfrac{1}{2}(19.1)A^2$$

$$A = \sqrt{\frac{2(.938)}{19.1}} = .313\ m$$ (d)