B.B 1.1 (2 pts)

Oscillation time $T = \frac{1}{f_0} = \frac{2\pi}{\omega_0}$

$\omega_0^2 = \frac{k}{m}$

$F = -kx \Rightarrow k = \frac{-F}{x} = \frac{-(0.5\,kg)(9.81\,m/s^2)}{(-0.04\,m)} = 123\ \frac{kg}{s^2}$

$\Rightarrow \omega_0 = \sqrt{\frac{123}{0.5}} = 16\ rad/s$

$\Rightarrow \boxed{T = 0.4\,s}$

Kinetic energy $K.E. = \frac{1}{2} M \left(\frac{dx}{dt}\right)^2$

$= \frac{1}{2} k C^2 \sin^2(\omega_0 t + \phi)$

$= \frac{1}{2}(123)(0.02)^2$

$\boxed{K.E. = 0.02\ Joules}$