Name _____ PHY2048C, Practice Quiz 3

A- Read all the quiz once, or twice, before beginning to write. Make sure to comprehend all questions and start with those you fell most confident.
B – Be clear and concise. There are no extra points for being verbose or writing extra.
C –Only use the white pages that I will provide. You have 60 minutes to answer the quiz.

Problem 1

In Figure 1 (a), you pull upward on a rope that is attached to a cylinder on a vertical rod. Because the cylinder fits tightly on the rod, the cylinder slides along the rod with considerable friction. Your force does work W = + 100 J on the cylinder-rod-Earth system (Figure 1 b). An "energy statement" for the system is shown in Figure 1 (c): the kinetic energy K increases by 50 J, and the gravitational potential energy U increases by 20 J. The only other change in energy within the system is for the thermal energy E_{th}.What is the change ΔE_{th}?

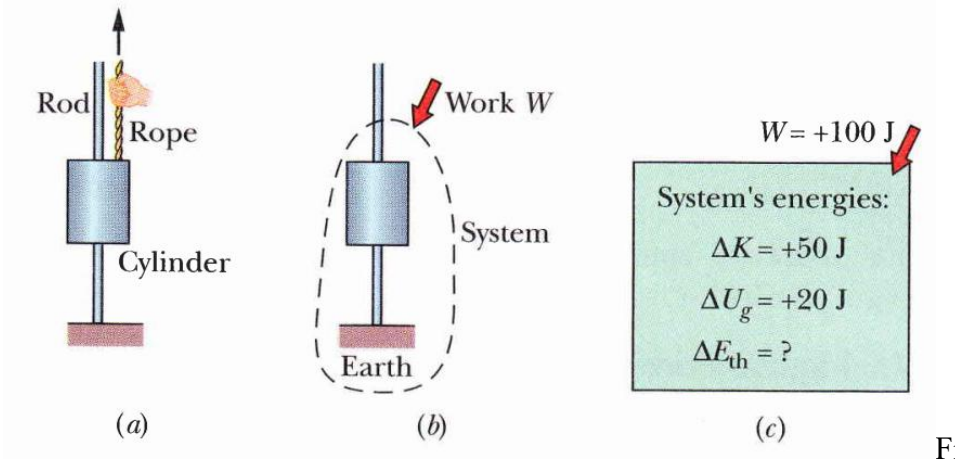
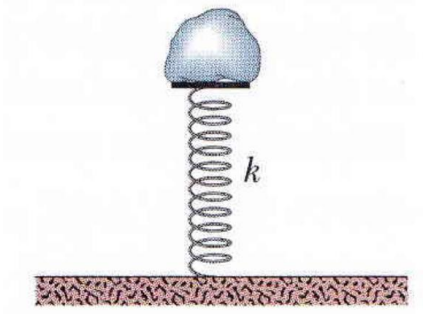


Figure 1

Problem 2

The figure shows an 8.00 kg stone at rest on a spring. The spring is compressed 10.0 cm by the stone while left alone. The stone is pushed down an additional 30.0 cm and released. What is the change in the gravitational potential energy of the stone-Earth system when the stone moves from the release point to its maximum height?



Problem 3

A cow is tied outside to a corner of a square 10-meter wide barn with a 30-meter long rope. What's the area of the grass it can graze?

Problem 3.5 (Extra)
In the Atwood machine, let m1 = 14kg be held at a height 5m above the ground and let m2 = 8kg be at rest on the ground. The masses are released from rest. Find the velocity of the 14kg mass just before it hits the ground in two ways: using F = ma and energy conservation

Problem 4 (Extra)
With what speed v0 must a particle be emitted from the bottom of a vertical circular track of radius R so that it can go around the top without falling?

Problem 5 (Extra)
A particle of mass m is in a periodic potential $V(x) = -A\cos(2\pi x)$. (a) Where are its minima? (b) What is the frequency of small oscillations about a minimum?

Problem 6 (Extra)
The Figure shows three situations involving a plane that is not frictionless and a block sliding along the plane. The block begins with the same speed in all three situations and slides until the kinetic frictional force has stopped it. Rank the situations according to the increase in thermal energy due to the sliding, greatest flrst