

Instructions:

1. Do all of your work on this sheet.
2. **Show all of your steps** in problems for full credit.
3. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place your **answers in a box**. Do not forget **units!**
5. If you need more space, you may use the back of the page and write **On back** in the problem space.

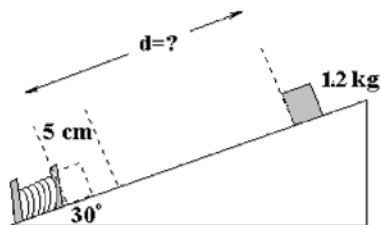
1. **Multiple Guess (3 pts)** Find the answer which best fits the question and write it in the space provided.

- a. All of the following are units of energy except
 - a) joules; b) horsepower; c) kilowatt-hours; d) ergs; e) none of these.
- b. A force $\mathbf{F} = 3.0\mathbf{i} - 4.0\mathbf{j}$ N is applied to a body undergoing a displacement of $\mathbf{d} = -2.0\mathbf{i} + 1.0\mathbf{j}$ m. The work done is
 - a) 10.0 J. b) 2.0 J. c) -10.0 J d) 11.0 J e) None of these.
- c. The amount of work required to stop a horizontally moving object is equal to the
 - a) velocity of the object; b) mass times acceleration of the object; c) the weight of the object; d) the initial kinetic energy of the object; e) none of these.

2. **Definition/Principle (3 pts)**

- a. What is the Work-Energy Theorem?
- b. Give a specific example of a nonconservative force.

Bonus: A 1.20 kg block slides down the incline shown and compresses a spring 5.0 cm as it comes to rest. If the spring constant is 1.00×10^3 N/m, what distance d did the block travel?



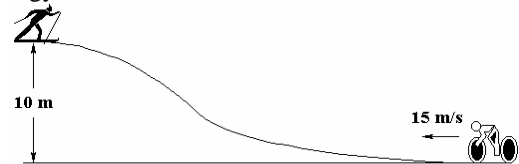
3. **Problems (14 pts)**

- a. A person pulls a toboggan 35.0 m along the snow with a rope directed at 60° above the snow. The rope's tension is 100.0 N. How much work is done on the by the tension force?



- b. In screeching to a halt, a car leaves skid marks that are 65 m long. The coefficient of friction between the tires and the road is $\mu_k = 0.71$. Use the Work-Energy Theorem to find the speed of the car before the brakes were applied.

- c. Use energy methods and assume a frictionless incline:



- i. How fast will the skier be moving at the bottom of the hill?
- ii. Can the cyclist coast to the top of the hill? If so, how fast will she be moving? If not, then how high will she get?

- d. A motor lifts a 500.0 kg elevator at a constant speed through a distance of 20.0 m in a time of 30.0 seconds. What is the average power expended by the motor?

- e. Let the force exerted on a body be given as $F(x) = 2x - 3$ N. Determine the work done by this force to move the body from $x = 1.0$ m to $x = 3$ m.