PHYSICS NAME _____
PROBLEMS: WORK & ENERGY DATE _____ PERIOD _____

FOR PROBLEMS MARKED WITH •, YOU SHOULD BE ABLE TO GET THE ANSWER BY INSPECTION, AND IT'S OK TO JUST WRITE THE ANSWER IN THE BLANK PROVIDED. FOR ALL OTHER PROBLEMS, SHOW METHOD CLEARLY IN THE SPACE PROVIDED.

1. A pulley is used to lift a log whose mass is 180 kg. 8.4 meters of rope passes through the hands of the person operating the pulley while the log rises 1.2 meters. The person operating the pulley pulls on the rope with a force of 300 N. Find the

a) work input

b) work output

c) percent efficiency

d) IMA

e) AMA

2. A crate is being pushed up a board of length 3 meters, which is being used as a loading ramp to get the crate into a truck whose bed is 1 meter off the ground. The crate weighs 750 N, and the force necessary to push it up the plane at constant speed is 350 N. Find the

a) work output

b) work input

c) percent efficiency

•d) IMA _____

e) AMA

3. A 20 kg suitcase is being lifted into the baggage compartment of an airplane, which is 5 meters above the baggage truck.

a) How much work is done on the suitcase?

•b) How much PE does the suitcase have in its elevated position? _____

•c) If the suitcase fell from the plane back down to the truck, how much KE would it have just before it hit the truck? _____

•d) As the suitcase falls, how much PE would it have at a height of 2.5 m? _____

•e) How much KE would it have at a height of 2.5 m as it falls? _____

•f) How much PE would it have at a height of 1 m as it falls? _____

•g) How much KE would it have at a height of 1 m as it falls? _____

h) How fast would it be going at a height of 1 m as it falls?

4. A 1 kg pendulum is pulled from its rest position until it has risen 0.5 meters vertically from its original height.

a) What is the PE of the pendulum relative to its rest position?

•b) If the pendulum is released, what is the KE at the bottom of the swing? _____

c) How fast will the pendulum be traveling at the bottom of the swing?

5. A spring similar to those used in the Hooke's Law lab has a spring constant of 20.0 N/m and a mass of 12.0 g.

a) How much potential energy is stored in the spring when it is stretched 8.0 cm?

•b) How much work had to be done to stretch it 8.0 cm? _____

•c) If the spring itself is "fired" by letting it go when it is stretched 8.0 cm (like shooting a rubber band at someone), what is its maximum possible kinetic energy? _____

d) What is its maximum possible speed?

6. A spring in a certain dart gun has a spring constant of 300 N/m. The spring is compressed 5.0 cm when a dart is inserted. The dart has a mass of 4.0 g and is to be shot straight up. Ignore friction and air resistance.

a) How much PE is stored in the spring when the dart is inserted?

•b) How much work is done to insert the dart? _____

•c) What is the maximum KE of the dart as it leaves the gun? _____

d) What is the maximum speed of the dart as it leaves the gun?

•e) What is the dart's kinetic energy at its highest point? _____

•f) What is the dart's potential energy (relative to the gun muzzle) at its highest point?

g) If the dart is fired straight up, what is the maximum height (above the gun muzzle) the dart will reach?

7. A 2.5 kg mass is attached to a string wrapped around the rim of a wheel. The mass falls 0.73 meters before the string disengages from the wheel.

a.) What is the loss in the mass' PE when it falls ?

•b) What rotational KE does the wheel have after the string comes off ? _____

c) What is the moment of inertia of the wheel if it has an angular velocity of 3.1 radians/second after the string comes off ?

d) If the same wheel is spun at twice the angular velocity (6.2 radians/second) what is its rotational KE ?