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NAME: _____

PHYSICS 50
WINTER 2010
EXAM 3

MAKE SURE TO SHOW ALL WORK IN COMPLETE DETAIL! NO CREDIT WILL BE GIVEN IF
NO WORK IS SHOWN!!!!

1. An object of mass 2.0 kg is pushed through a displacement $\vec{s} = 15m\ \hat{i} - 12m\ \hat{j}$ by a force $\vec{F} = 15N\ \hat{i} - 12N\ \hat{j}$.

   a) Calculate the work work done by the force.

   b) Calculate the angle between $\vec{s}$ and $\vec{F}$.

2. A helicopter lifts a 72 kg astronaut 15 m vertically from the ocean by means of a cable. The acceleration of the astronaut is g/10.
    a) Calculate the work done by the cable on the astronaut.
    b) Calculate the work done by gravity on the astronaut.
    c) Just before reaching the helicopter calculate the speed of the astronaut. (assume astronaut was lifted up from rest)

3. A 200 g block is pressed against a spring (K = 1400 N/m) until the block compresses the spring 10.0 cm from equilibrium. The spring rests at the bottom of a frictionless incline plane of angle 60^0. The block is released from rest. (Use Work-Kinetic Energy Theorem to solve this problem)
   a) Calculate the speed of the block when it passes through the equilibrium position of spring.
   b) Calculate the maximum distance it moves up the incline plane.

4. An elevator cab has a mass of 4500 kg and can carry a maximum load of 1800 kg. Calculate the minimum power output of the motor required to move the full load upward at 3.80 m/s.

5. The force acting on a particle is shown graphically below. Calculate the work done on the particle from x = 0 to x = 40 m.

F(N)

15N

-15N

10   20   30   40   x(m)