

Name \_\_\_\_\_

U4: Homework Questions #2

*Work/Energy/Power*

1. A weight lifter lifts a mass  $m$  at constant speed to a height  $h$  in time  $t$ . How much work is done by the weight lifter?
  - a.  $mg$
  - b.  $mh$
  - c.  $mgh$
  - d.  $mght$
  - e.  $mgh/t$
2. When an object is moved from rest at point A to rest at point B in a gravitational field, the net work done by the field depends on the mass of the object and
  - a. the positions of A and B only
  - b. the path taken between A and B only
  - c. both the positions of A and B and the path taken between them
  - d. the velocity of the object as it moves between A and B
  - e. the nature of the external force moving the object from A to B
3. An archer pulls her bowstring back  $0.40$  m by exerting a force that increases uniformly from zero to  $230$  N.

(a) What is the equivalent spring constant of the bow?

N/m

(b) How much work does the archer do in pulling the bow?

J

4. A force  $\vec{F} = (4.00 \hat{i} - 1.00 \hat{j})$  N acts on a particle that undergoes a displacement  $\Delta\vec{r} = (2.00 \hat{i} + 1.00 \hat{j})$  m.

a. Find the work done by the force on the particle.

J

b. What is the angle between  $\vec{F}$  and  $\Delta\vec{r}$ ?

°

5. A 1.4 kg block is initially moving at 3.00 m/s to the right when it is located at  $x = 0.0$  m on a horizontal frictionless surface. A horizontal net force in the positive  $x$ -direction is applied to the block. The force is given by  $F(x) = ([2.7 \text{ N}] - [2.80 \text{ N/m}^2] x^2) \text{ N}$ , where  $x$  is in meters and the initial position of the block is  $x = 0$ .

(a) What is the work done by the net force as the block moves from  $x = 0.0$  to 2.0 m?

J

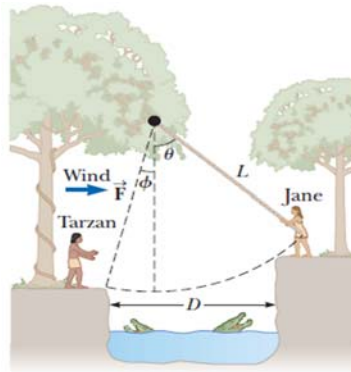
(b) What is the kinetic energy of the block as it passes through  $x = 2.0$  m?

J

(c) What is the speed of the block when it passes through  $x = 2.0$  m?

m/s

6. Jane, whose mass is 50.0 kg, needs to swing across a river of width  $D$  filled with crocodiles to save Tarzan from danger. She must swing into a wind exerting constant horizontal force  $F$ , on a vine having length  $L$  and initially making an angle  $\theta$  with the vertical. Take  $D = 50.0$  m,  $F = 110$  N,  $L = 40.0$  m, and  $\theta = 50$  degrees.



a. With what minimum speed must Jane begin her swing to just make it to the other side?

m/s

b. Once the rescue is complete, Tarzan and Jane must swing back across the river. With what minimum speed must they begin their swing? Assume Tarzan's mass to be 80 kg.

m/s