

### Spring-2018 Phys101

#### Assignment 6

#### Check Mating Physics for other problems

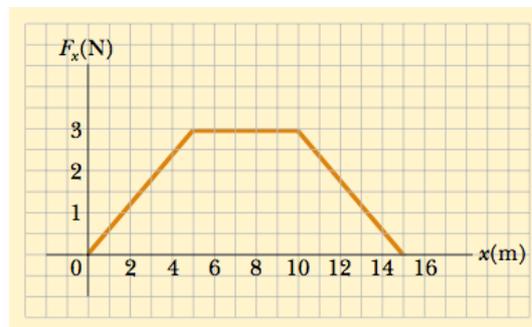
Due date: 25 March 2018.

#### Discussion questions

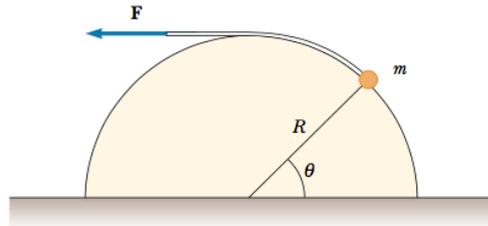
- 1- An elevator is hoisted by its cables at constant speed. Is the total work done on the elevator positive, negative, or zero? Explain.
- 2- If work  $W$  is required to stretch a spring a distance  $x$  from its unstretched length, what work (in terms of  $W$ ) is required to stretch the spring an *additional* distance  $x$ ?
- 3- A box rests on frictionless table in a truck. As the truck accelerates forward, the box accelerates backward on the table. What is the total work done on the box (with respect to a stationary frame of reference) when the truck has accelerated for a distance 1 meter?
- 4- How many joules of energy does a 100-watt light bulb use per hour? How fast would a 70-kg person have to run to have that amount of kinetic energy?

#### Problems

- 5- On an essentially frictionless, horizontal ice rink, a skater moving at 3.0 m/s encounters a rough patch that reduces his speed to 1.65 m/s due to a friction force that is 25% of his weight. Use the work–energy theorem to find the length of this rough patch.
- 6- A particle is subject to a force  $F_x$  that varies with position as shown below. Find the work done by the force on the body as it moves from  $x=0$  to  $x=15$  (m).



7- A small mass  $m$  is pulled to the top of a frictionless half-cylinder (of radius  $R$ ) by a cord that passes over the top of the cylinder, as illustrated below. Find the work done in moving the mass at constant speed from the bottom to the top of the half-cylinder.



8- A 650-kg elevator starts from rest. It moves upward for 3.00 s with constant acceleration until it reaches its cruising speed of 1.75 m/s.

- What is the average power of the elevator motor during this period?
- How does this power compare with its power when it moves at its cruising speed?