# Unit IV: Worksheet 5

1. Hulky and Bulky are two workers being considered for a job at the UPS loading dock. Hulky boasts that he can lift a 100 kg box 2.0 meters vertically, in 3.0 s. Bulky counters with his claim of lifting a 200 kg box 5.0 meters vertically, in 20 s. Justify which worker has a greater power rating.

2. A 1994 Ford Mustang is driving down a road with a constant speed of 30 m/s. The engine must exert a 5000 N force to maintain this speed.

    a. Calculate the power of the engine.

    b. Compare the 1994 Mustang's power to that of the 460hp 2021 Ford Mustang GT's engine. (1 hp = 746 W)

3. An 82 kg hiker climbs Mt. Humphrey near Flagstaff. During a two hour period, the hiker's vertical elevation increases by 540 meters.

    a. Calculate the climber's ΔE_g.

    b. Calculate the power generated to increase the hiker's E_g.

4. Calculate how long would it take a 7.5 KW motor to raise a 500 kg piano to an apartment window 10 meters above the ground.

5. Your electric utility company sends you a monthly bill informing you of the number of kilowatt-hours you have used that month.
   a. Is the utility charging you for energy or power? Explain.

   b. Calculate how many joules your 1600W blow drier transfers if you dry your hair in 5.0 min.

6. Three identical springs (A,B,and C), each with an unstretched length of 1.0 m and spring constant of 2.0 N/m are attached on the edge of a circular hoop with radius of 4.0 m as shown in the bird's eye view to the right. A small object is attached to each spring and comes to rest in the center of the hoop.
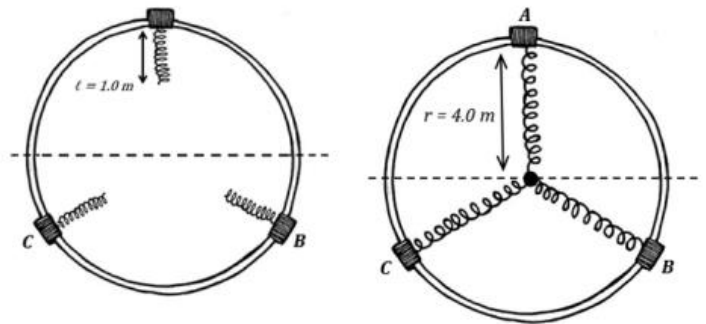
   a. Calculate the work done in attaching the springs to the object.

   The mass is moved 3 m to the left, as shown to the right.

   b. Was the work done to move the object positive or negative? Justify your answer.
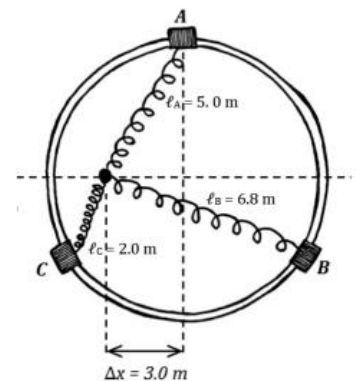
   c. The object is released and returns directly to its original position in 2.5 s. Calculate the power done by the springs in returning the object to this position.