Chapter 7

1. In 1990, Walter Arfeuille of Belgium lifted a 281.5-kg object through a distance of 17.1 cm using only his teeth. (a) How much work was done on the object by Arfeuille in this lift, assuming the object was lifted at constant speed? (b) What total force was exerted on Arfeuille's teeth during the lift?

2. The force acting on a particle varies as shown in Figure P7.14. Find the work done by the force on the particle s it moves (a) from $x = 0$ to $x = 8.00$ m, (b) from $x = 8.00$ m to $x = 10.0$ m, and (c) from $x = 0$ to $x = 10.0$ m.

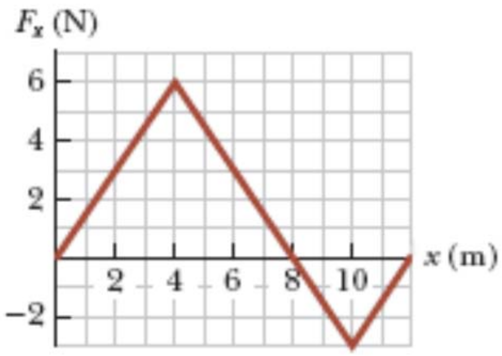


**Figure P7.14**

3. A 3.00-kg object has a velocity $\left(6.00\hat{\mathbf{i}} - 2.00\hat{\mathbf{j}}\right)\mathrm{m/s}$. (a) What is its kinetic energy at this moment? (b) What is the net work done on the object if its velocity changes to $\left(8.00\hat{\mathbf{i}} + 4.00\hat{\mathbf{j}}\right)\mathrm{m/s}$? (*Note:* From the definition of the dot product, $\upsilon^2 = \vec{\mathbf{v}} \cdot \vec{\mathbf{v}}$.)

4. A 0.20-kg stone is held 1.3 m above the top edge of a water well and then dropped into it. The well has a depth of 5.0 m. Relative to the configuration with the stone at the top edge of the well, what is the gravitational potential energy of the stone–Earth system (a) before the stone is released and (b) when it reaches the bottom of the well? (c) What is the change in gravitational potential energy of the system from release to reaching the bottom of the well?

5. A single conservative force acts on a 5.00-kg particle within a system due to its interaction with the rest of the system. The equation $F_x = 2x + 4$ describes the force, where $F_x$ is in newtons and $x$ is in meters. As the particle moves along the $x$ axis from $x = 1.00$ m to $x = 5.00$ m, calculate (a) the work done by this force on the particle, (b) the change in the potential energy of the system, and (c) the kinetic energy the particle has at $x = 5.00$ m if its speed is 3.00 m/s at $x = 1.00$ m.

Chapter 8

1. A ball of mass $m$ falls from a height $h$ to the floor. (a) Write the appropriate version of Equation 8.2 for the system of the ball and the Earth and use it to calculate the speed of the ball just before it strikes the Earth. (b) Write the appropriate version of Equation 8.2 for the system of the ball and use it to calculate the speed of the ball just before it strikes the Earth.

(Equation 8.2 $\Delta \mathrm{K} + \Delta \mathrm{U} + \Delta E_{int} = W + Q + T_{MW} + T_{MT} + T_{ET} + T_{ER}$)
$T_{MW}$ (Mechanical wave)
$T_{MT}$ (Matter transfer)
$T_{ET}$ (Electrical transmission)
$T_{ER}$ (Electromagnetic radiation)

2. A block of mass *m* = 5.00 kg is released from point Ⓐ and slides on the frictionless track shown in Figure P8.6. Determine (a) the block's speed at points Ⓑ and Ⓒ and (b) the net work done by the gravitational force on the block as it moves from point Ⓐ to point Ⓒ.

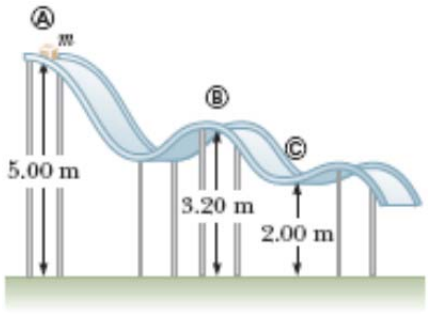


**Figure P8.6**

3. A 40.0-kg box initially at rest is pushed 5.00 m along a rough, horizontal floor with a constant applied horizontal force of 130 N. The coefficient of friction between box and floor is 0.300. Find (a) the work done by the applied force, (b) the increase in internal energy in the box-floor system as a result of friction, (c) the work done by the normal force, (d) the work done by the gravitational force, (e) the change in kinetic energy of the box, and (f) the final speed of the box.