7. A crane does 62,500 joules of work to lift a boulder a distance of 25.0 meters. How much did the boulder weigh? (HINT: The weight of an object is considered to be a force.)

8. You lift a 45-newton bag of mulch 1.2 meters and carry it a distance of 10 meters to your garden. How much work was done?

9. A 455-newton gymnast jumps upward a distance of 1.50 meters to reach the uneven parallel bars. How much work did she do before she even began her routine?

10. It took a 500-newton ballerina a force of 250 joules to lift herself upward through the air. She landed a total of 2.5 meters to the left after completing her jump. How high did she jump?

11. A people-moving conveyor belt moves a 600-newton person a distance of 100 meters through the airport. How much work was done?

12. A 600-newton passenger at the airport lifts his 100-newton carry-on bag upward a distance of 1 meter. They ride for 100 meters on the "people mover." How much work was done in this situation?

Mixed Practice

10. A mover is loading a 253 kg crate of hammers onto a truck. The upward force on the crate is 2470 N, and 3650 J of work are required to raise the crate from the pavement to the truck bed. How far is the crate lifted?

_____

11. The mover in problem 13 uses a ramp, which makes the task easier by requiring a smaller force to raise the crate to the truck bed. This force must be exerted over a greater distance, so the work done should be the same. In reality, because of the frictional force between the crate and the ramp, the work required is greater than that needed to lift the crate directly onto the truck. The mover does 4365 J of work sliding the crate up the ramp. The force the mover exerts on the crate is 1302 N. How long is the ramp?

_____

12. A popular and dangerous circus act is the human cannonball, in which a person is shot from a cannon. Suppose the cannon has a barrel that is 3.05 m long and 1.67×10^4 J of work is done to accelerate the acrobat. What is the force exerted by the cannon on the acrobat?

_____

13. The highest occupiable floor of any building is in the Sears Tower in Chicago. The elevators of the central tower of the building lift passengers 436 m above street level. If a continuous force of 2.23×10^4 N is exerted on one of these elevator cars as it travels from the ground to the top floor, how much work is done on the elevator car by the elevator's lifting mechanism?

14. A freight train leaving a train yard must exert a force of 2.53×10^6 N in order to increase its speed from rest to 17.0 m/s. During this process, the train must do 1.10×10^9 J of work. How far does the train travel?

_____

15. In 1947, Northrop Aircraft developed and built a deceleration sled to test the effects of extreme forces on humans and equipment. In this sled, a test pilot with a mass of 70.0 kg undergoes a sudden negative acceleration of 4.90×10^2 m/s^2. This deceleration occurs over a distance of 8.05 m. How much work is done against the pilot's body during the deceleration?

_____