1. A block of wood of mass 0.62 kg is firmly attached to a horizontal spring of stiffness constant 180 N/m. The block slides on a horizontal surface. The spring is compressed a distance 0.050 m and released, after which the block travels a distance of 0.023 m beyond the neutral position of the spring before starting to turn back. How much work was done by friction?

Answer: -0.177 J

2. A 1500-kg car is traveling down a 20° hill. The car begins braking when its speed is 25 m/s and slows to a speed of 17 m/s in a distance of 200 m measured along the hill. Calculate the thermal energy dissipated by the brakes.

Answer: -1.26×10^6 J

3. A 60-kg person is tied to a bungee cord of unstretched length 12 m; the other end of the bungee cord is tied to a bridge railing. The bungee cord has an effective stiffness constant of 120 N/m. How far would the person fall from the bridge?

Answer: 28.8 m

4. When a 1700-kg automobile is moving at a constant speed of 15 m/s, the motor supplies 16 kW of power to overcome friction and wind resistance. (a) What power must the engine supply if the car is to move up a 4.6° hill at 15 m/s? (b) What is the angle of a hill down which the car could coast at 15 m/s with no engine power?

Answers: (a) 36 kW (b) 3.7°