Chapter 6   Work and Energy

Example 1:
A 100 lb horizontal force pushes a 200 lb crate 10 ft across the floor. (a) If the coefficient of friction is 0.3, how much work is done by each of the forces acting on the crate? (b) What is the total amount of work done on the crate?

Example 2:
A boy pulls a 5 kg sled 25 m at a constant speed across the horizontal ground. The rope makes a 37° angle with the horizontal and the coefficient of friction is 0.24. (a) What is the work done by each of the forces acting on the sled? (b) What is the total amount of work done on the sled?

Example 3:
You push down on a 15 kg box while pushing it across a rough horizontal surface.   The 180 N push is angled 12° below the horizontal. If the coefficient of friction is 0.13 and you move the box 2.25 m, how much work do you do?

Example 4:
When a 3 kg mass is attached to a vertical spring, the spring stretches 27 cm.   How much work must be done to stretch spring an additional 15 cm?

Example 5:
A 250 N/m spring has an un-stretched length of 8 cm. A force stretches the spring until it is 12 cm long. How much work was done by the stretching force?

Example 6:
A 2.6 kg box rests on a rough ($\mu = 0.67$) horizontal floor. Find the change in the kinetic energy of the box if a 31.2 N horizontal force pushes the box 12.4 m. (Assume the box starts from rest.)

Example 7:
One end of a 1000 N/m spring is attached to a wall; a 5 kg block is attached to the other end. If the spring is then compressed a maximum of 10 cm, what is the maximum speed of block after the spring is released? (Assume that the block moves on a smooth horizontal surface.)

Example 8:
A 90 lb girl climbs up a 12 ft length of rope. If she can develop 0.1 hp, how long does it take her to climb the rope? (Assume that she climbs at a constant speed.)

Example 9:
A car needs 30 hp in order to travel at a constant 60 mph. What is the frictional force that acts on the car?