Suppose you have a 136-kg wooden crate resting on a wood floor. (For each answer, enter a number. 𝜇*k* = 0.3 and 𝜇*s* = 0.5)

(a)

What maximum force (in N) can you exert horizontally on the crate without moving it?  
666.4  N

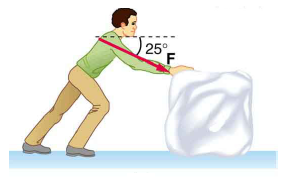
(b)

If you continue to exert this force (in m/s2) once the crate starts to slip, what will the magnitude of its acceleration (in m/s2) then be?  
1.96  m/s2

**2.**

**question**

A contestant in a winter games event pushes a 48.0 kg block of ice across a frozen lake as shown in the figure below.



A person is pushing a block of ice to the right on the surface of a frozen lake. The person is applying force on the top-left corner of the block. The arrow representing the force vector **F** is shown to act diagonally downward from the shoulder of the person to the top-left corner of the block. This arrow is at an angle of 25° below the horizontal from the person's shoulder level.

The coefficient of static friction is 0.1 and the coefficient of kinetic friction is 0.03. (For each answer, enter a number.)

(a)

Calculate the minimum force *F* (in N) he must exert to get the block moving.  
54.44  N

(b)

What is its acceleration (in m/s2) once it starts to move, if that force is maintained?  
.71  m/s2

**3.question**

The terminal velocity of a person falling in air depends upon the weight and the area of the person facing the fluid. Find the terminal velocity (in meters per second and kilometers per hour) of an 84.0 kg skydiver falling in a pike (headfirst) position with a surface area of 0.180 m2. (Assume that the density of air is 1.21 kg/m3 and the drag coefficient of a skydiver in a pike position is 0.7. For each answer, enter a number.)

terminal velocity in m/s  
103.91  m/s

terminal velocity in km/h  
374.08  km/h

**4.**

**question**

Semi-trailer trucks have an odometer on one hub of a trailer wheel. The hub is weighted so that it does not rotate, but it contains gears to count the number of wheel revolutions—it then calculates the distance traveled. If the wheel has a 1.02 m diameter and goes through 110,000 rotations, how many kilometers should the odometer read? (Enter a number.)  
352.49  km

**5.**

**question**

Helicopter blades withstand tremendous stresses. In addition to supporting the weight of a helicopter, they are spun at rapid rates and experience large centripetal accelerations, especially at the tip. (For each answer, enter a number.)

(a)

Calculate the magnitude (in m/s2) of the centripetal acceleration at the tip of a 4.70 m long helicopter blade that rotates at 325 rev/min.  
5442.79  m/s2

(b)

Compare the linear speed of the tip with the speed of sound (taken to be 340 m/s).

*v*tip/*v*sound =.47

†

**6.question**

(a)

A 15.0 kg child is riding a playground merry-go-round that is rotating at 50.0 rev/min. What centripetal force (in N) must she exert to stay on if she is 2.00 m from its center? (Enter a number.)  
823.73  N

(b)

What centripetal force (in N) does she need to stay on an amusement park merry-go-round that rotates at 3.00 rev/min if she is 5.00 m from its center? (Enter a number.)  
7.39  N

(c)

Compare each force with her weight. (For each answer, enter a number.)

(force from (*a*))/(weight) =5.6 (force from (*b*))/(weight) =.05