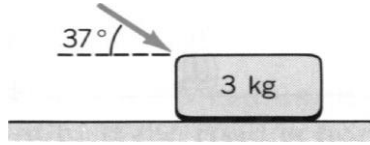


Homework #7

1) A 3.15-kg block is acted on by a 24.0-N force that acts at 37.0° below the horizontal, as shown in the figure. Take $\mu_k = 0.200$ and $\mu_s = 0.500$. (a) Does the block move if it is initially at rest? (b) If it is initially moving to the right, what is the block's acceleration?



2) A block is released at the top of a 25° incline. Determine the coefficient of kinetic friction given that it slides 2.30 m in 3.15 s.

3) A circular off ramp has a radius of 57.0 m and a posted speed limit of 50.0 km/h. If the road is horizontal, what is the minimum coefficient of friction required?

4) A car travels at speed v around a frictionless curve of radius r that is banked at an angle θ to the horizontal. Show that the proper angle of banking is given by $\tan(\theta) = \frac{v^2}{rg}$. (Hint, this is easier if you don't rotate the coordinate system like most other incline problems, and treat the x-axis as the horizontal direction, and the y-axis as the vertical direction. This is because the centripetal force is horizontal.)

5) A button is at the rim of a turntable of radius 15.0 cm rotating at 45.0 rpm. What is the minimum coefficient of friction needed for it to stay on?

6) A box is dropped onto a conveyor belt moving at 3.40 m/s. If the coefficient of friction between the box and the belt is 0.270, how long will it take before the box moves without slipping?

7) Two blocks are stacked as shown below, and rest on a frictionless surface. There is friction between the two blocks with a coefficient of friction μ_s . An external force is applied to the top block at an angle θ with the horizontal. What is the maximum force F that can be applied for the two blocks to move together?

