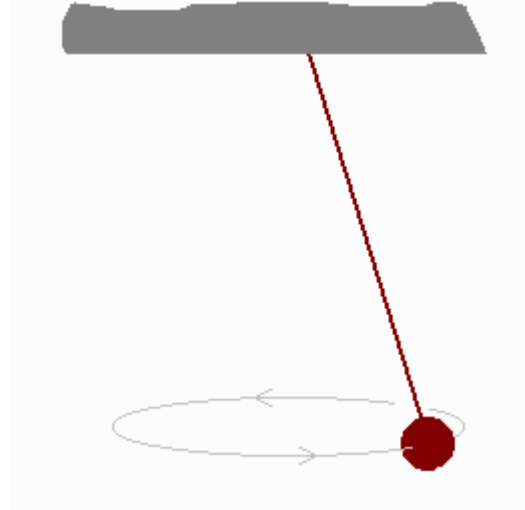


DAY 17

Homework Assignment (see syllabus for homework collection information)

1. A *conical pendulum* is a pendulum that is not pulled back and released, so as to be set swinging back and forth, but rather that is pulled back and given a sideways shove so that the pendulum bob swings in a circular path. The name comes from the fact that the pendulum's cord traces out a cone shape.

Create an FBD of the pendulum, neglecting air resistance. Show that none of the forces acting on the pendulum do any work. What does this tell you about the speed of the pendulum? Explain.



Now add air friction to the picture. Do an FBD and discuss why air drag does work when the other forces do not. What happens to the pendulum's energy?



2. A kid is trying to break off a branch from a fallen tree. The branch is 10 feet long and the end (E) is 4 feet off the ground. The kid weighs 110 lbs and hangs on the branch. What torque does he produce?
3. $\mathbf{G} = \mathbf{i} \times \mathbf{j}$. Here \mathbf{i} and \mathbf{j} have the usual meanings (points out the x and out the y axes, respectively). What direction does \mathbf{G} point?

Re-work for $\mathbf{G} = \mathbf{j} \times \mathbf{i}$.

4. A 120 kg crate is lifted 2 m vertically by pushing it up a roller ramp (low friction). The force required to push the crate up the ramp was 40 lb. How long was the ramp and what was its angle of incline?

5. Sketch all the vectors in a spinning top. Show views as seen from the front, the side, and above. A side view has been started for you.

