PHY140Y

Spring Term – Week 5 Discussion

1 February, 1999

1. A block of mass 2.4 kg is placed on an incline plane of slope $\phi = 30^\circ$ and is attached by a light string to a solid drum at the top of the incline of mass 0.85 kg and radius 5.0 cm. The string is wound around the drum so that the drum will rotate if the block slides down the plane. Got that picture?

   When released, the block accelerates down the plane at $a = 1.6\ \mathrm{m/s^2}$. What is the coefficient of friction between the block and slope.

2. A physics students is standing on a frictionless turntable that has a moment of inertia $I_t = 0.31\ \mathrm{kg \cdot m^2}$. She is holding a wheel with a rotational inertia $I_{wh} = 0.22\ \mathrm{kg \cdot m^2}$. She is holding it up the axis perpendicular, and the wheel is spinning at 130 rpm.

   She now turns the wheel upside down, and she and the turntable start spinning at 70 rpm. Assume that we can approximate the student as a solid cylinder with diameter 30 cm. How heavy is she? You can ignore the difference between the axis of the wheel and the spin axis of the student and turntable.