Warm-up problems to be done BEFORE recitation #2
Physics 271, Fall 2017

Note: these 5 problems should seem pretty easy. You can check your answers by going back to the recitation web page and clicking on the links you find there. If you find you are rusty or never learned the topic properly, please review the relevant section of a standard college-level textbook or find materials on the internet, and/or come to office hours before this week's recitation.

1. PROJECTILE PROBLEM

A projectile is fired horizontally from a gun that is 45.0 m above flat ground, emerging from the gun with a speed of 250 m/s.
(a) How long does the projectile remain in the air?
(b) At what horizontal distance from the firing point does it strike the ground?
(c) What is the magnitude of the vertical component of its velocity just before it strikes the ground?

2. UNIFORM CIRCULAR MOTION

A rotating fan completes 1200 revolutions every minute. Consider the tip of a blade, at a radius of 0.15 m.
(a) Through what distance does the tip move in one revolution?
(b) What is the tip's speed?
(c) What is the magnitude of the tip's acceleration?
(d) What is the period of the motion?

3. RELATIVE MOTION IN 1D

A cameraperson on a pickup truck is traveling westward at 20 km/h when she records a cheetah that is moving westward 30 km/h faster than the truck. Suddenly, the cheetah stops, turns and then runs at 45 km/h eastward, as measured by a crew member who is standing on the ground.
(a) What are the magnitude and direction of the cheetah's initial velocity relative to the crew member standing on the ground?
(b) What are the magnitude and direction of the cheetah's final velocity relative to the cameraperson?
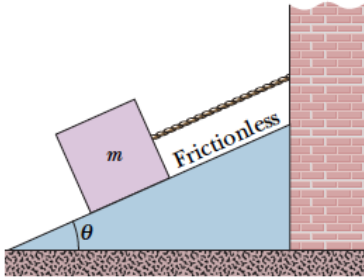
4. BLOCK ON FRICTIONLESS INCLINE
In the figure, let the mass m of the block be 8.5 kg and the angle θ be 30 degrees.
(a) What is the tension in the cord?
(b) What is the normal force acting on the block?
(c) If the cord is cut, what is the magnitude of the resulting acceleration of the block?
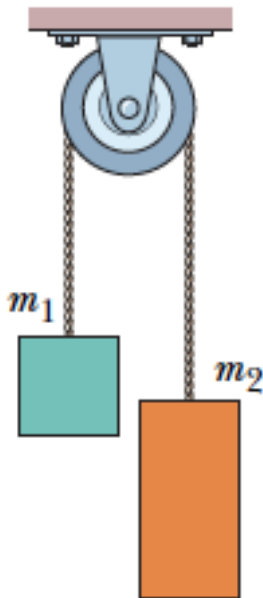
5. ATWOOD MACHINE
The figure shows two blocks connected by a cord that passes over a frictionless pulley (assume the mass of the cord and the mass of the pulley wheel are zero). One block has mass $m_1 = 1.30$ kg; the other has mass $m_2 = 2.80$ kg.
(a) What is the magnitude of the acceleration of block 1? Of block 2?
(b) What is the tension in the cord?

*most of these are adapted from Halliday Resnick and Walker 10th ed Chapter 4 & 5.