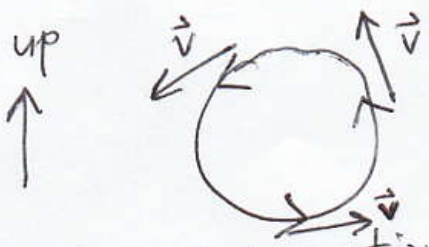
Some homework due Thursday

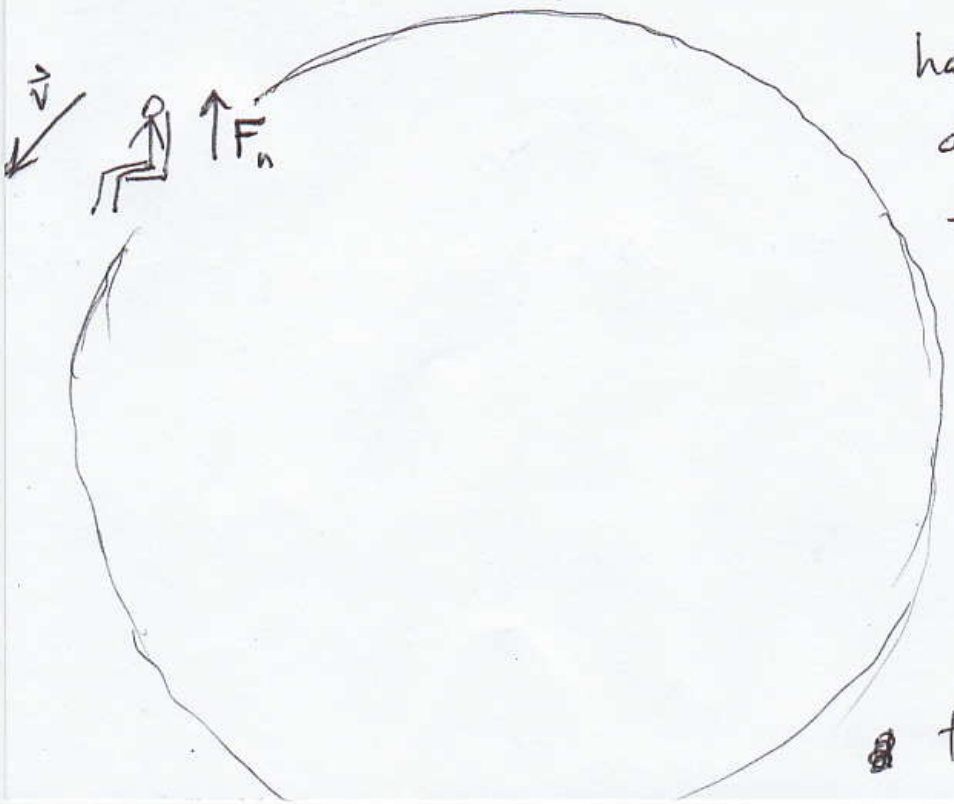
#1 Use $a = v^2/r$ for uniform circular motion, Kepler's Laws, and Newton's 2nd Law to prove that $g \propto 1/r^2$, that is, that gravitational field strength is inversely proportional to distance squared.

#2 A Ferris wheel can be modelled with vertical uniform circular motion.



A rider feels an upward normal force from his/her seat. (Call it F_n.) (Ignore sideways forces from straps, etc.)

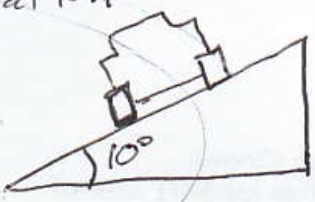
Assume the wheel has diameter 18.0m and spins counterclockwise at a uniform rate of 15 seconds per revolution.



If the rider has a mass of 65kg, find F_n (a) at the top of the wheel; (b) at the bottom.

#3 A car going around a curve on a flat road can be modeled as horizontal circular motion. (a) If a car has a mass of 1350 kg, then what is the fastest it can drive around a curve with radius (of curvature) 70m? Assume $\mu_s = 0.6$.

(b) Redo part (a) with a banked curve, that is, a curved road that does not change height as you forward or back, but is tilted toward the inside of the curve. Assume an angle of elevation of 10°.



horizontal circular motion of car

Hint for (b): Look at x and y components of the forces and acceleration