DAY 5

1. A kid at the Extreme Park is moving on a skateboard at 5 m/s. The kid hops the skateboard board up onto a metal rail and grinds along the length of the rail (6 m). At the end of the rail the kid's speed is down to 3 m/s. What is the kid's acceleration and how long did it take him to travel the length of the rail?

2. In the above problem, if the kid weighs 130 lb, what is his mass and what is the net force acting on him?

3. In example problem #2 for today, at what constant speed would Li'l Bro have to pedal in order to win the race? (HINT – obviously greater than 7 m/s.)

4. A drag racer covers a quarter mile in 10.2 sec -- starting from rest. Find the average acceleration of the car in m/s^2 and mph/s.

5. A ball rolling on a ramp experiences an acceleration of 4 m/s^2 in the direction shown. The ball is moving at a rate of 2 m/s up the ramp. It is located 2 m up the ramp (measured from the bottom of the ramp). How far up the ramp will it move? How fast will it be going when it reaches the bottom of the ramp? How long will it take to reach the bottom of the ramp?
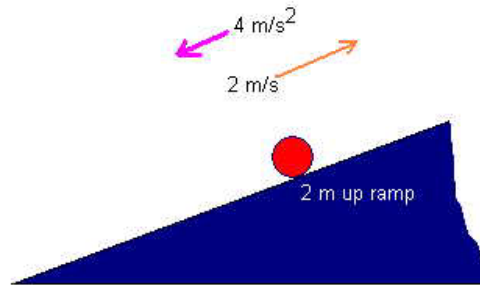
6. A speeder is traveling at 50 mph in a 30 mph zone. A cop on a motorcycle clocks him. She takes off after him 5 sec after he passes her. If she accelerates at an average rate of 8 mph/s, how long will it take her to catch up to him? How far down the road will she travel before catching him? Assume he's oblivious and continues on at the same speed the whole time.

7. **PHY 231 ONLY**
   What do you get when you differentiate
   $x = x_0 + v_0 t + \frac{1}{2} a_{avg} t^2$
   with respect to time? Work it out.