Physics 200 Name(s) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Motion Video Scavenger Hunt

**Overview**: Capture video clips meeting each of the motion requirements below. Care must be taken to capture videos that may be analyzed using frame-by-frame analysis. You will be using these videos to create graphs of position vs. time and velocity vs. time (and possibly acceleration vs. time).

1. Constant Velocity (or nearly constant)
2. Acceleration (increasing speed)
3. Deceleration (decreasing speed)
4. Velocity that changes sign – positive to negative or vice versa.
5. Fastest velocity
6. Fastest acceleration

**Steps**:

1. Get a video camera and a meter stick. Then, in the school, the classroom, or just outside one of the school entrances, find or create an object that demonstrates the required motion.
2. Capture a video of the object’s motion. Use each of the methods below for at least one of your videos.
3. Confirm that the video is satisfactory. Then trim it to be as short as possible.
4. Find a way to transfer the video so that you and your partner(s) can access it on the school computers. To preserve high resolution and Iphone slow motion frame rate, uploading via a cable is recommended. The easiest method of sharing may be to upload the video to your Google Drive and share it.
5. Next class-- Use the video footage to create graphs of position vs. time and velocity vs. time.

**Two methods of capturing useful video**:

1. **The object moves along a motionless “ruler” (camera can be moving).** For example, you could follow an object that is moving along a tiled floor, in the same direction as the floor tiles. If the floor tiles are even in size, you can measure them and use them as your video *ruler*. Another ruler could be bricks on the side of the building. The ruler could also, literally, be a ruler or meter stick.
   1. For best results:
      1. **The ruler and the object should be the same approximate distance from the camera**. Otherwise perspective issues will distort your data.
      2. **Brighter lighting is best, especially for fast subjects.** This increases the camera’s shutter speed and decreases blurring.
2. **The camera is kept motionless as the object moves near an object of known length.** For this method to work well there must be an object of known length situated in the field of view at the same distance from the camera as the moving object. Again, this could be an actual ruler or meter stick. The analysis is easy to do using the Logger Pro software we used with the motion sensors.
   1. For best results:
      1. **The camera must be kept still.** During video capture, try to prevent the camera from being rotated, tilted or moved in any way.
      2. **The moving object that is being measured should remain a constant distance from the camera.** It should not be approaching or moving away from the camera. If the object approaches or moves away from the camera, the size scale will change and you’re your position data. If it’s feasible, moving farther away from the object can minimize this problem.
      3. **The moving object and the ruler should be the same distance from the camera.**
      4. **Brighter lighting is best, especially for fast subjects**