

# PEP 151 Observational Project 1

## Apparent motion of the Sun

In this project you will record the apparent motion of the Sun in your local sky, and explain what you observe in the context of the dependence of the Sun's path on the time and location as we discussed in class.

### 1) Simulation

Write down the latitude of your current location and the date of your actual observation.

Enter those into the simulator,

<https://astro.unl.edu/classaction/animations/coordsmotion/sunmotions.html>,

to simulate the path of the Sun in your local sky on that day.

Take screenshots of your simulation at 3 time points: 6 am, 12 pm and 6 pm. You can drag the needles on the clock to change the time of the day.

### 2) Actual Observation

Use a camera to record the motion of the Sun in your local sky with a sequence of at least 6 photos, each ten minutes apart. The camera needs to be (more or less) stationary throughout the sequence, so that the framing is the same for all photos. Further, some landscape needs to be in the frame so that the motion of the Sun relative to the stationary landmark can be seen.

You need to record the type of camera used (and camera settings if known), the date (mm/dd/yyyy) and time (hh:mm:ss) of each shot, the azimuth direction your shot is facing.

Overlay all photos in your sequence into one single photo to show the motion of the Sun. I'll leave it up to you to explore and choose how you want to do this. It doesn't need to be anything fancy – simply overlaying all photos and adjust their transparency will do, as long as the Sun in all individual shots are visible in the combined image.

#### **\*\*Safety precautions\*\***

##### **To avoid permanent damages to your eyes:**

- **Do not, under any circumstances, look directly at the Sun through any kind of lenses with your eyes.**
- **Do not stare directly at the Sun with your naked eyes either.**

##### **To avoid damages to your camera sensor:**

- **Look up the safety precautions of the camera you use before pointing it at the Sun.**
- **Do not point the camera directly at the Sun for prolonged period.**

Given the safety precautions, it is safer to photograph the Sun when it is low on the horizon. You can also use filters to further reduce light intensity. If you have control over the settings of your camera, use the short exposure time and low sensitivity setting (ISO).

### 3) Report writeup

Document what you did in part 1) and 2) in a report. In the report, you should:

- a) Provide a brief introduction of the project.
- b) List all the information mentioned in part 1) and 2), such as latitude, date, time etc.
- c) Include the 3 screenshots from the simulation in part 1). Comment on whether the sun rises due east and sets due west in your simulation, and explain why (in terms of your location and the Sun's location at a given season).
- d) Include the sequence of individual shots of the Sun from part 2), and label each shot with information such as the date and time as described in part 2).
- e) Include the combined single photo where it shows the motion of the Sun. Indicate where the range of the motion you **observed** would fit on the **simulated** path of the Sun --- you can highlight it on one of the screenshots of the simulation.

Convert the report into **one single pdf** file and upload it to canvas. No need to separately attach your screenshots or photos. Put everything into the report.