

Meteor 101 – Lab #1

Lab objectives

- 1) Learn about how the Sun's path, through the sky, changes with the changing seasons
- 2) Learn about how the Sun's path changes while viewing it at different locations on the Earth

Setup

This lab will be performed in the Stellarium (version 0.15.1 or newer) planetarium program. You can access the Stellarium Planetarium program on specific computers at the following computer labs

- OC Bremerton: ST 122 Computers: 1-4
- OC Poulsbo: OCP 106 Computers: 11-13
- OC Shelton: OCS PA2 Computers: 1-2

or you can download a free copy at <http://www.stellarium.org/> (Windows, Mac OS and Linux versions of the program are available). Instructions for installing the program and system requirements can be found in the user's guide. Stellarium may not run properly on Windows Vista. If you encounter some problems, try downloading a different version of Stellarium by clicking on the "**older releases**" link. You can access the user's guide from the link on the Stellarium homepage.

1) Learning the user interface and setting up your home location

➤ Start up the Stellarium program.

To look around the sky, point the cursor to a location on the sky, left-click and hold down the button, then drag the cursor around. Use the mouse scroll wheel (or Page Up/Down) to zoom in and out.

At the bottom left of the screen, you can see the *Status Bar*. This shows the current observer location, field of view (FOV), graphics performance in frames per second (FPS) and the current simulation date and time. If you move the cursor over the *Status Bar*, it will reveal the *Main-Toolbar* which provides additional controls.

To advance time forward and backward, click on the arrow buttons on the toolbar. From left to right, the buttons will

- Decrease the rate at which time passes and move **multiple times** to increase the speed
- Make time pass as normal
- Return to the current time & date
- Increase the rate at which time passes (click **multiple times** to increase the speed)



back in time (click

When the mouse is moved to the left, lower half of the screen, the **Left-Toolbar** becomes visible.



Set Location:

Click on the compass icon on the **Left-Toolbar** to bring up the *Location pop-up window*.
Type *Seattle* in the search window and then click on the Seattle option.

Click on the **X** to close the *Location pop-up window*.

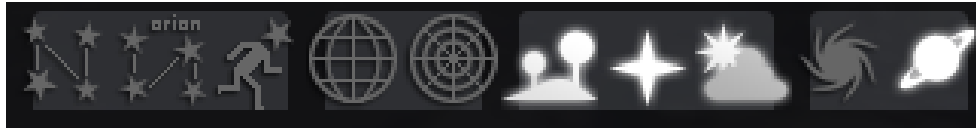
The screenshot shows a software window titled "Location" with a close button (X) in the top right corner. On the left is a world map with a red arrow pointing to the Pacific Northwest of North America. On the right, a search bar contains the text "seattle" with a magnifying glass icon to its left. Below the search bar is a button labeled "Reset Location List".

Below the map and search area is a section titled "Current location information" containing several input fields and controls:

- Latitude: N 47° 36' 22.35" (with up/down arrows)
- Longitude: W 122° 19' 55.45" (with up/down arrows)
- Altitude: 56 m (with up/down arrows)
- Name/City: Seattle (text input)
- Country: United States (dropdown menu)
- Planet: Earth (dropdown menu)

At the bottom of the section are two buttons: "Return to default location" and "Delete". Below these are two checkboxes: "Use current location as default" (unchecked) and "Get location from Network" (checked).

Main-Toolbar (move the mouse over the *Status Bar* on the bottom of the screen):



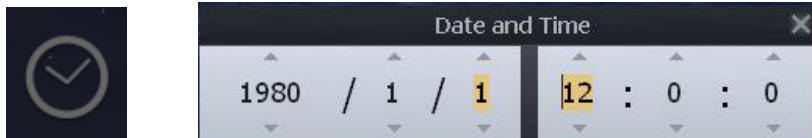
From left to right, the buttons will start the following actions:

- *Constellations* - Draws the constellation lines
- *Constellation Names* - Draws the name of the constellations
- *Constellation Art* - Superimposes artistic representations of the constellations over the stars
- *Equatorial Grid* - Draws grid lines for the **RA/Dec** coordinate system
- *Azimuth Grid* - Draws grid lines for the **Altitude/Azimuth** coordinate system
- *Ground* - Toggles drawing of the ground. Turn this **off** to see objects that are **below the horizon**
- *Cardinal Points* - Toggles marking of the **North, South, East** and **West** points on the horizon
- *Atmosphere* - Toggles atmospheric effects. Most notably makes the **stars visible in the daytime**
- *Nebulae & Galaxies* - Toggles on/off labels to mark the positions of Nebulas and Galaxies
- *Planet* - Toggles on/off indicators to mark the position of **planets**

Information about the other buttons can be found in the user's guide.

Click on each button to see what action they perform. Click again to toggle the option off.

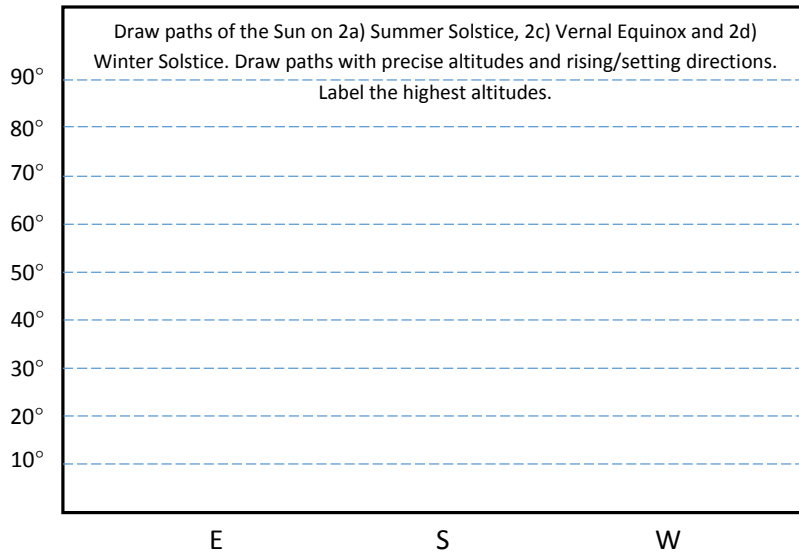
2) Path of the Sun at Seattle



Click on the *Clock icon* on the **Left-Toolbar** to bring up the *Date and Time popup window*. The year, month, day, hour, minutes and seconds can be modified by typing in new values, by clicking the up and down arrows, and by using the mouse wheel.

2a) Set the date to the **Summer Solstice (6/21)**. In the box below, draw the Sun's path, through the sky, from Sunrise to Sunset. Draw the Sun's path with the correct **altitude**, and with precise rising and setting **directions**. (Hint: Click on the *Azimuthal Grid icon* on the **Main-Toolbar** to draw grid lines to help you with your drawing.)

2b) When the Sun has reached its highest point, label the **altitude** of the Sun in degrees (round to the closest degree). To measure the altitude, move the cursor over the Sun and *left-click* to bring up information about the Sun. Altitude (Alt) is given in degree° arcminute' arcsecond" ($1^\circ = 60'$, $1' = 60''$). *Right-click* on the mouse to remove the information.



2c) Repeat steps (2a) and (2b) for the **Vernal Equinox (3/20)**.

2d) Repeat steps (2a) and (2b) for the **Winter Solstice (12/21)**.

3) Path of the Sun in the Arctic Circle

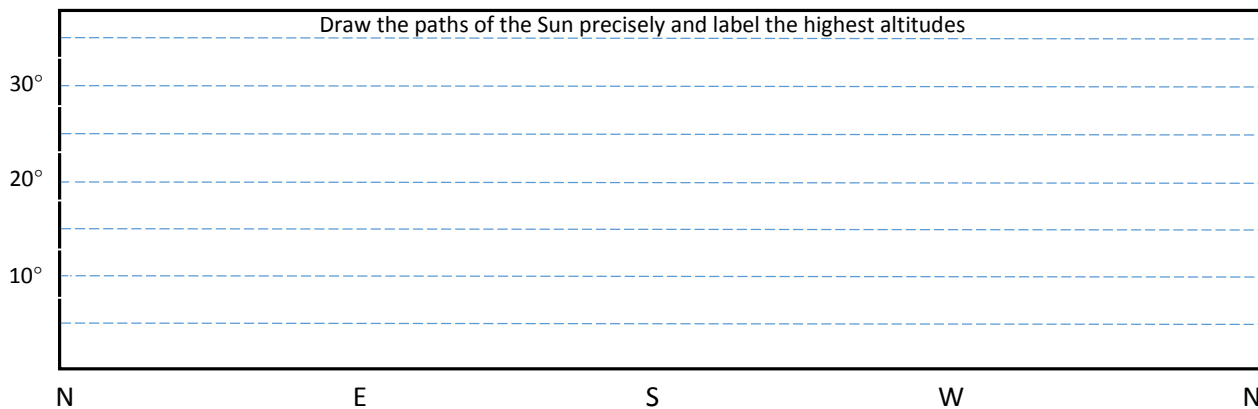
3a) Click on the *Compass icon* on the **Left-Toolbar** to bring up the *Location pop-up window*. Change the Latitude to: **N 80°** and press enter.

3b) Observe the Sun's path, through the sky, on the **Summer Solstice (6/21)** (over a 24 hour period). In the box below, draw the path of the Sun from North – East – South – West – North.

3c) When the Sun has reached its highest point, label the **altitude** of the Sun in degrees (round to the closest degree).

3d) Repeat steps (3b) and (3c) for the **Vernal Equinox (3/20)** and the **Winter Solstice (12/21)**. If the Sun does not rise above the horizon, then fill in the following: the Sun is not visible on the

_____.

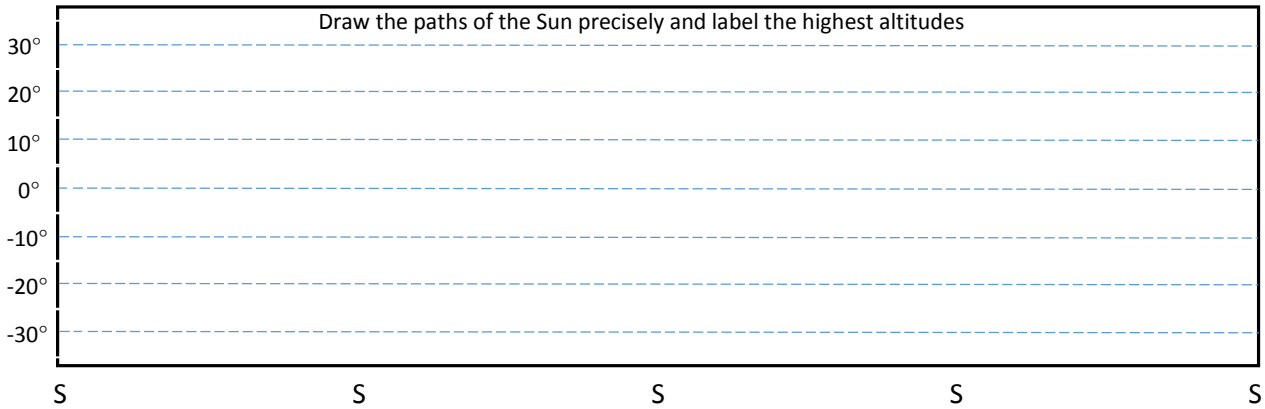


4) Path of the Sun at the North Pole

4a) Change the Latitude to: **N 90°**

4b) In the box below, draw the path of the Sun on the **Summer Solstice (6/21)**, **Vernal Equinox (3/20)** and **Winter Solstice (12/21)**. (Hint: Click on the *Ground icon* on the **Main-Toolbar** to remove the ground)

4c) When the Sun has reached its highest point in (4b), label the **altitudes** of the Sun in degrees



5) Path of the Sun at the Equator

5a) Change the Latitude to: **N 0°**

5b) In the box below, draw the path of the Sun on the **Summer Solstice (6/21)**, **Vernal Equinox (3/20)** and **Winter Solstice (12/21)**.

5c) When the Sun has reached its highest point in (5b), label the **altitudes** of the Sun in degrees

* 5d) **Draw arrows** to indicate the direction of the Sun's motion

