



Starry Night Directions For Unit 1 Challenge

Introduction

For students to investigate the findings of archeologists at the ancient astronomy observatory, it will be necessary for you to set up specific locations at specific times so students can make observations and collect evidence to substantiate each claim. You can decide whether to discuss each claim with the entire class or to let small groups work through the claims and then have them prepare a presentation or report as a culminating assessment.

Preparation

Go through the entire Starry Night Challenge directions to locate the various menus and options. Look at the Teacher Guide answer key as you complete each claim.

Suggested Procedure

1. Set the initial date, place, time for Claim One before students enter the class.
2. Have students read the introductory information on page 56.
3. Discuss the Map of the Ruins diagram on pg. 57. You may have to point out that the structures on the left side and middle of the map are pyramids as seen from above. Also, the closely spaced lines on the buildings are stairs.
4. Have students read the background information for Claim #1 either silently or aloud. Then read the Claim as it is stated in the yellow box.
5. Explain to students that you are going to transport them back in time, a time when people lived in this city. Go to the place and time indicated below and follow the directions to allow students to make the observations and gather the evidence they need.
6. An answer key is provided in the Teacher Guide.

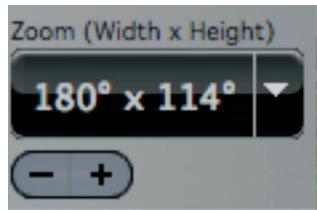
Starry Night Directions

Challenge Presets

Do the following before students enter the class. You can save it as a project and open it up when you need it.

1. Go to Options/Other Options/Local Horizon and click the first box to make a flat horizon.
2. Go to the Starry Night drop down menu and choose Preferences.

3. Use the drop down menu at the top to choose Cursor Controls.
4. Check the following boxes: Altitude, Azimuth, Distance to the Sun, Name, Rises, Sets, and Transit. Uncheck everything else.
5. Set the time for 12:00 AM, the date April 1, the year 400 AD. (The easiest way to do this is to click once on each time and date box and then use the up and down arrows to select the right number.)
6. Set the Time Flow Rate to minutes.
7. Go to the Options menu and select Viewing Location. Select Latitude/Longitude and type in the coordinates of the observatory (20° 10' N, 104° 5' W, Time Zone: -7.0).
8. Set the direction to south and then change the zoom to 180° X 114° by using the minus key of the Zoom tool.



9. Go the View menu, select Alt/Az Guides/Grid. You should see altitude and azimuth lines marked in white on the screen.
10. You will use this basic set up for all the claims.

Claim One

11. Explain to students that they are seeing the sky in exactly the same why the people in the city saw it 1400 years ago. Let the time run through 1 day so students can see the general motion of the sun at this location. Point out when the sun transits (crosses the meridian at 180° azimuth).
12. The next time the sun transits stop the time and hold the cursor on sun so students can see what the present altitude of the sun is. Ask students if they think the sun will get higher or lower in the sky as time passes. Some students might notice that the sun at this location is already higher in the sky than it ever gets at their location.
13. Continue the time and let students observe how the sun's altitude changes over time. You might want to point out the changes in the moon's phases as days pass. Tell students to tell you when to stop and make an observation of the sun's altitude.
14. The sun will approach 79° altitude on the meridian on April 13th.

Claim Two

15. View is still south, time still in minutes. Make sure the zenith is visible on the screen. Change the date to January 1, 400 AD. The students must determine when the sun reaches the zenith in this location.
16. Run one day and have students measure the approximate altitude using the grid. Ask them if time should be advanced a month or should the previous month be checked.
17. Advance a month and repeat this procedure until you are in May. Then run time forward until the sun is at zenith (May 19).
18. Ask students to predict when the sun is going to be overhead again. Go to whatever month is suggested and let students observe the motion of the sun. Proceed until students find the second date (July 23rd).

Claim Three

19. Use the same scene but change the date to March 22nd, the date of the vernal equinox, and the time to 4 AM. Set the direction to east.
20. Advance the time until the sun rises. Tell students to take down the azimuth of the sun on this date.
21. Advance the date and time to 4 AM on June 22nd. Have students find the azimuth of the sun on this date.
22. Repeat for September 22nd and December 22nd.

Claim Four

23. Go to view and select Hide Daylight.
24. Go to the View menu and then select Constellation/Labels. Then go to the View menu again and select Constellation/Constellation Options and click on Stick Figures.
25. Go to the Labels menu and click on Stars. Set the view to east.
26. Set the time for January 1, 400 AD and run the program until Orion rises. Advance slowly until the bright star below Orion becomes visible (Sirius). Have students note that the azimuth of this star is 107° . Have the record the time of rising for Sirius.
27. Advance one month at a time and have students compile their data.

Claim Five

28. Turn off the constellation labels.
29. Change the sky position to due north. Turn on the grid or just place the cursor over Polaris to reveal its altitude (Polaris is NOT at 21° , the position it is in today). This might be a good time to run the time forward one day to show the circumpolar motion of the nearby constellations.

Claim Six

30. Change the date and time to 6 AM March 4, 445 AD.
31. Change to direction to east (90° azimuth).
32. Go to the Labels menu and click Planets and Moons. Also turn the constellation names back on (View/Constellations/Labels).
33. Run the time forward (minutes) so students can see which planet is closest to Orion on March 4th (Mars is closest).
34. Repeat the observation for March 4, 446 AD.

Claim Seven

35. Leave the constellation names on the screen and reset the date for January 1, 400 AD.
36. Click on the Find tab on the left side of the screen and type in Draco. Hit return.
37. Click on the View menu and select Ecliptic Guides/The Ecliptic.
37. Run time forward (minutes) through an entire day and let students see where the planets align compared to the location of Draco and Ursa Minor. (Claim is false.)