

Stellarium Stellar Transits Worksheet

1. Set London as your location (L: 51° 31'). Set the time as now.
2. Make sure the following features are OFF: atmosphere, constellations.

Make sure the ground and cardinal points are ON.
3. Press the Z key on the keyboard to turn the horizontal grid on. This will show you the horizontal coordinates of your horizon in London.
4. Press the semicolon “ ; ” key on the keyboard. This turns on the local meridian. Turn your view using the arrow keys and take note how it runs from North to South.
5. Locate the Star Fomalhaut using the finder. Turn due South using the arrow keys and fast forward/rewind the time so that Fomalhaut culminates on the local meridian. Press pause to stop the time once the star is directly over the meridian (pause by pressing the play button while the simulation is running).
6. Press the fullstop key “ . ” on the keyboard. This turns on the Celestial Equator (CE). Notice how it runs East to West using the arrow keys. Notice where Fomalhaut is with respect to the CE. Use the appropriate formula from your notes to verify the relationship between the altitude (ALT on the star’s details) and Declination (DE on the star’s details).
7. Use the appropriate formula to test whether Fomalhaut is a circumpolar star for an observer in London. Verify your result on Stellarium by following Fomalhaut as the time goes by.
8. Press the Z key to turn the horizontal grid off.
9. Press the E key to turn the equatorial grid on. This shows the Equatorial coordinate system on the night sky. Note how it is tilted, due to your longitude.
10. Turn around using the arrows and verify that:
 - i) Polaris is practically at the top of the “dome” of the Equatorial Grid, but not on the top of your horizon (you’re in London, not the North Pole).
 - ii) The local meridian goes through the top of the dome (right by Polaris)
 - iii) The celestial equator cuts the celestial sphere in two hemispheres (temporarily turn the ground feature off to verify and then turn it back on).
11. Turn due North and locate the star Capella. Is it circumpolar? How can you tell? Verify your answer using the simulation in Stellarium by running time forward.

Notice the transits. Write down the altitude of Capella during its Upper Transit and during its Lower Transit.

Upper Transit Altitude:..... Lower Transit Altitude:.....

Can you use these two numbers to calculate the latitude of London?

Latitude =

12. Center your view so that Polaris is at the middle of the screen. Study the dark blue numbers at the edges of the grid. What are the lines numbered in hours called? What are the lines numbered in degrees?
13. With your screen still centered at Polaris, start the time and observe how the hour circles move. East to West / West to East (choose).
14. Pause the time. The hour circle directly above the local meridian defines a certain time called LOCAL SIDEREAL TIME (LST). Press play again, and, notice how as the hour angles cross the local meridian, the LST changes accordingly.
15. Turn and look due South. Press play again and observe the hour circles move.
16. Locate the Star Fomalhaut and move it so that it lies directly above the local meridian. Pause Stellarium when it is so. Compare the star's Hour Angle and its Right Ascension. Do this for two more stars when they culminate over the south horizon.

What do you observe?

17. Indeed, the Right Ascension of any star is identical to its hour angle when it crosses the local meridian. This is very useful – it allows us to calculate the rising and setting times of any star.
18. Turn time back so that Fomalhaut lies directly over the horizon (without taking into account any trees/buildings).

Use the clock on Stellarium and note down Local Time:.....

Use the arrow keys to look up and look on the meridian.

Use the hour circles to work out Local Sidereal Time:.....

(if you don't remember, turn to no. 14).

Applying the rule that "when Fomalhaut culminates, its RA will be equal to the LST.

Write down the RA of Fomalhaut:.....

How much is the time difference between the LST when Fomalhaut is rising and when Fomalhaut is culminating?

Time difference:.....

Therefore, what will your prediction be for what the Local Time will be when Fomalhaut culminates?

Verify your answer using stellarium (press play until Fomalhaut is on the local meridian and look at the local time).

Can you predict what time Fomalhaut will set?

What is your argument for your prediction?

Prediction:.....

Test your prediction using Stellarium.