

# ACTIVITY WITH STELLARIUM



## DESCRIPTION

This activity will allow you to become familiar with the different options available in *Stellarium*. The questions are general and do not refer to a specific latitude or date. It is therefore not possible to provide answers in some cases. However, explanations are provided to understand the observations made using the program.

You can do this activity with your students. Simply copy/paste the questions and if necessary, modify them to adapt to the level of your group.

## INSTRUCTIONS

Begin by downloading *Stellarium* ( [www.stellarium.org](http://www.stellarium.org) ) and installing it on your computer.

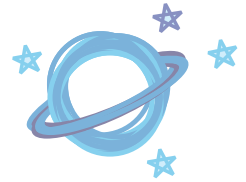
The menus in *Stellarium* can be accessed by moving the cursor to the left and bottom parts of the screen. The first step is to set up your location by using the *Location window* at the top of the left menu. In most cases, *Stellarium* can now pick up your location using your IP address. If not, you can choose a nearby city from the menu, click on the map or directly enter your coordinates if you know the longitude and latitude of where you are.

The bottom menu is where you can activate the constellations, remove the atmosphere, accelerate time... You can always use the *Help window* (left menu) to learn about the different shortcuts and options. In particular, you can zoom using the PageUp/Down keys or the wheel on your mouse, depending on the computer.

It helps to keep the *Date/time window* open at all times. You can move it the corner so it does not block the view.



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1. **Name three bright stars visible in the sky tonight. In which direction are they located?** Once you have selected your location, fast forward the time (if necessary) so you can see the night sky. By default, the brightest stars are identified. You can move around to see different parts of the sky (north, south, east, west).
2. **Activate the constellations with their labels. In which constellation do these stars belong?** The options for the constellations (lines and labels) are available in the bottom menu.
3. **How far are these stars?** Click on the star to see its information in the top left corner of the screen. The distances are given in light years.
4. **Fast forward the time and observe how the stars seem to move throughout the night. Make sure to look in all directions (N,S E, W). What do you notice?** Stars seem to move from east to west because of the Earth's rotation: they rise in the east, reach their highest point in the sky due south and then set in the west. Looking north, you can see circumpolar stars and constellations. These stars never set: they are always visible in the sky from this location. The further north you go, the more circumpolar stars you will see.
5. **Using the *Date/time window*, increase the time in one-day steps. How does the sky change?** Every day, the stars seem to move slightly westward. Actually, the stars rise four minutes earlier every day which means the whole sky seems to shift westward if you observe at the same time night after night. After one month, the stars will rise two hours earlier.
6. **Compare the sky tonight with the sky in two months at the same time. What difference do you see?** Everything moved westward: what was already in the west is now below the horizon and new stars have appeared in the east.
7. **Find a planet and increase the time in one-day steps to see its motion relative to the stars. You can also remove the atmosphere (bottom menu) to see the motion in the daytime. What do you notice?** To locate a planet, you can use the *Search window* in the left menu or simply fast forward the time until one rises. Since the planets are in orbit around the Sun, they seem to move relative to the background stars. In fact, the word «planet» comes from the Greek word «wanderer».





8. **Find the Moon, centre it (using the Space key) and zoom in to see its phase. Draw it and then repeat for the next day or several days to observe the changes in its shape.** Note : with the display scale, the Moon is too small to see its phase. It's therefore necessary to zoom in or check the option *Scale Moon* in the *Sky and viewing options window*.
9. **Find Orion, the main winter constellation. What are the names of the three stars in his belt?**  
Alnitak, Alnilam and Mintaka
10. **Show the constellation art (bottom menu). What does Orion look like?** Orion is a hunter, with a lion's skin in his left hand and a weapon in his right hand. Note: Once you are done looking at the constellation art, you can remove this option since it might slow down the program.
11. **Type «M42» in the Search window. The display will automatically move to centre on the object. Zoom in and describe what you see.** M42 is the Messier catalogue number for the Orion nebula. It is a large cloud of gas and dust where new stars are being formed. In other words, it's a stellar nursery!
12. **Compare the sky in the Northern Hemisphere with the sky seen from the equator and from the Southern Hemisphere. In particular, look at the position of Polaris, the North Star.** The constellations which are visible vary from one location to another, depending on the latitude. From the Northern Hemisphere, it is impossible to see many constellations located far south. The reverse is also true. For example, Polaris is only visible from the Northern Hemisphere. Its altitude, or height relative to the horizon, is exactly equal to the latitude of the observer. For someone located at a latitude of  $45^\circ$  N, Polaris would be exactly  $45^\circ$  above the northern horizon. From the equator, Polaris would be directly on the horizon (height of  $0^\circ$ ) while someone at the North Pole would see Polaris directly overhead (height of  $90^\circ$ ).
13. **Look at the sky on your birth date and on some of your birthdays since. Does it vary from year to year?** The stars are almost exactly at the same place from year to year on the same date. They appear to move slightly and then come back to where they were after 4 years during leap years. However, because of their motion in the Solar system, the planets and the Moon are not always in front of the same stars on that date.





14. **Go to the year 99 999 and try to identify familiar constellations such as Ursa Major. Can you recognize it?** *Stellarium* takes into account the actual motions of the stars within our galaxy. During our lifetime, this motion is not perceptible. However, the sky will be unrecognizable in thousands of years.
15. **Come back to today's date and play with the constellations from different cultures. To do so, go in the *Sky and viewing options window* and click on *Starlore* tab.** The official constellations used today as a reference system come from the Western culture. However, many other cultures have invented their own constellations and mythology. You can learn about the different starlore in the tab which also provides links to study the matter further.
16. **In the *Sky and viewing options window*, go back to the Western constellations. Under the *Markings* tab, check the *Ecliptic line (of date)*. This line represents the path of the Sun in the sky throughout the year. To be more precise, also check *Show boundaries for the constellations*. Identify the constellations which are crossed by the ecliptic. Do they seem familiar?** These are the zodiac constellations: Scorpius, Libra, Virgo, Leo, Cancer, Gemini, Taurus, Aries, Pisces, Aquarius, Capricornus and Sagittarius. The constellation Ophiuchus is also found along the ecliptic.

