# LIGHT POLLUTION

Light pollution prevents the enjoyment of starry skies even in favorable weather conditions. It diminishes the visibility of stars and other celestial objects, and the perception of the Universe on a large scale. The light pollution of a place on our planet is measured by the radiance of the light at night. Let's take a look at our planet.

## Task 1. Getting geographic coordinates of a place.

The geographic coordinates of a place are a set of numbers that show the location of that place on Earth. The coordinates we are going to use are latitude and longitude.

1. Google the school for which you want to get the geographical coordinates. Copy the name of the school from the table and paste it into the search engine. When you find it, click on Maps in the toolbar.
2. Right-click on the map site. A pop-up window will open. You can see the latitude and longitude in decimal format at the top.
3. To copy the coordinates automatically, left-click on the latitude and longitude. Paste the coordinates into the table.

| SCHOOLS | Geographic Coordinates |
|---|---|
| CEIP Ciudad de Ceuta | 35.887569, -5.323223 |
| IES Vega de Atarfe | 37.219582, -3.688444 |
| Budapest II. Kerületi II. Rákóczi | 47.512791, 19.025249 |

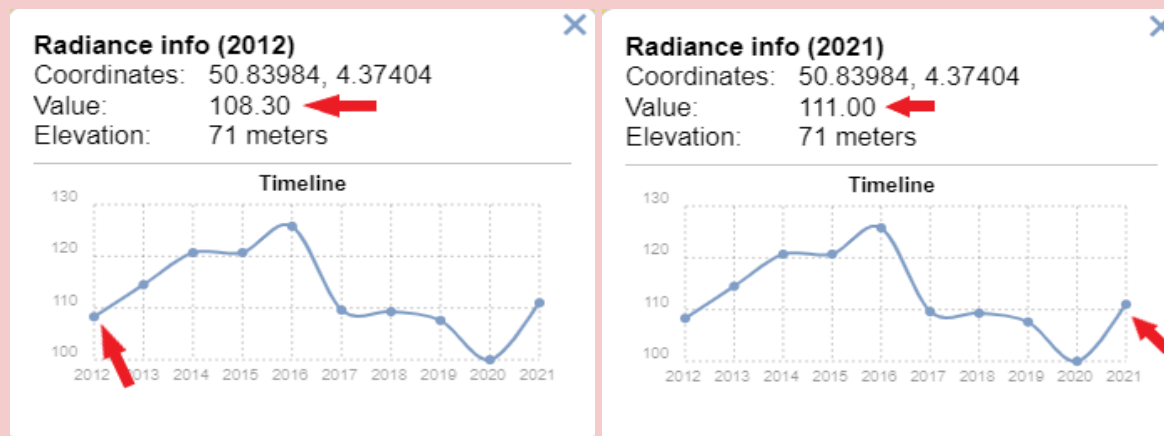| Ferenc Gimnázium | |
| --- | --- |
| SUGS Gimnazija Josip Broz Tito | 41.994914, 21.427703 |

# Task 2. Getting radiance of a place

To measure light pollution we need to measure the glare of night-time light in a place. The higher the radiance, the higher the light pollution.

1. Open Light Pollution Map on your computer.
2. Paste the geographic coordinates of the school in the search engine.



3. Radiance (value). Find the value of the night light radiance of that school on the Timeline. Move the mouse over the points on the Timeline to find the value in 2012 and 2021. Write it on the table.

Radiance info (2012)
Coordinates: 50.83984, 4.37404
Value: 108.30 ←
Elevation: 71 meters

Timeline

Radiance info (2021)
Coordinates: 50.83984, 4.37404
Value: 111.00 ←
Elevation: 71 meters

Timeline

4. Trend. Calculate by how many points the Radiance has changed between 2021 and 2012 (Radiance 2021 - Radiance 2012). Write the result on the table.

| SCHOOLS | Radiance 2021(value) | Radiance 2012(value) | Trend |
|---|---|---|---|
| CEIP Ciudad de Ceuta | 120 | 228,9 | 108,9 |
| IES Vega de Atarfe | 55,9 | 58,0 | 2,1 |
| Budapest II. Kerületi II. Rákóczi Ferenc Gimnázium | 37,9 | 33,6 | 4,3 |
| SUGS Gimnazija Josip Broz Tito | 232,6 | 194,7 | 37,9 |

QUESTIONS:

Which school are the stars best observed from?

Write your answer here:  II.Rákóczi Ferenc Gimnázium Budapest

Which school has light pollution decreased in?

Write your answer here: All except CEIP Ciudad de Ceuta

Which school has light pollution worsened the most in?

Write your answer here: CEIP Ciudad de Ceuta

# Task 3. Astronomical Observatories.

Light pollution diminishes and distorts the brightness of stars or any other stellar object, and affects the work of observatories and astronomers. This pollution is especially present in cities and for this reason astronomical observatories are located in regions far away from cities. Do you know which astronomical observatories are closest to your school?

As a class, write the name of two astronomical observatories you would like to visit in your country.

TIT Posztoczky Károly Csillagvizsgáló és Múzeum
Debrecen Heliophysical Observatory
Konkoly Observatory

# Task 4. Obtain the CO2 emissions of a country.

Another problem of light pollution is its effect on the environment. To light our streets at night we need electricity and when electricity is produced CO2 is emitted. An increase in CO2 emissions leads to an increase in environmental pollution.

The United Nations was created after the Second World War with the mission to promote peace and security in the world, promote sustainable and inclusive development, and protect human rights. It is part of the UN's mission to serve as a global data hub to make information available to the world.

| SCHOOL (Country) | Population (thousands of people) | CO2 emission (million tons) 2021 | CO2 emission (tons per capita) 2021 | CO2 emission (tons per capita) 2015 | Trend |
|---|---|---|---|---|---|
| **CEIP Ciudad de Ceuta (Spain)** | 46745 | 229.9 | 4.9 | 5.3 | -0.4 |
| **IES Vega de Atarfe (Spain)** | | | | | |
| **Budapest II. Kerületi II. Rákóczi Ferenc Gimnázium (Hungary)** | 9634 | 45.7 | 4.7 | 4.3 | 0.4 |
| **SUGS Gimnazija Josip Broz Tito (North Macedonia)** | 2080 | 8,9 | 4.28 | 4.21 | |

Which country is the most populated?

Which country is the least populated?

Which country emits the most million tons of CO2?

Which country emits the least tonnes of CO2 per capita?

In which country have CO2 emissions per capita increased?

In which country have CO2 emissions per capita decreased the most?