Cross-cutting geospatial and environmental STEAM instruments
for the new generation (GOSTEAM)
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GOSTEAM Hands-on Activity Template *(Classroom-Formal)*

Title:

Earth Graticule

Short Description (Max 500 words):

to understand the graticule of the earth and the relation to GPS coordinates

Keywords (Up to 5):

Information about the Implementation

Age and language of the students:

Language:	Age:	9-12	12-15	15-18	18+
		■	☐	☐	☐

Number of Lessons – Duration (per lesson):

Number of Lessons: 2 (-3)

Duration per Lesson:

Subjects:

For which subject(s) the activity is usable, is it an interdisciplinary activity?

Science ☐

Physics ☐ Chemistry ☐ Biology ☐ Geosciences ■ Environmental ☐ Other ☐

Technology ☐

Engineering ☐

Arts ☐

Mathematics ☐

Information about the Scenario

Curriculum and country:

Link of the current activity to the curriculum:

Country: Austria Class: 1 Grade: 6th

Topic: Earth Graticule

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Objectives (Max 100 words):

Description of the learning objectives

They should understand the graticule of the Earth by watching a learning video and by using a globe. To ensure this knowledge they get a worksheet to calculate the coordinates and an online blank text should be filled in- it controls itself and students can try it again if the results are not satisfying. To understand the relation to GPS coordinates, they should search for locations in Google Maps and identify GPS Coordinates and find the coordinates of their home, school,…

Materials (Max 100 words):

Which resources and materials (software, hardware) are needed?

Youtube, Globe, worksheet Moodle, Google Maps, (Phyphox)

Spatial concepts, skills and abilities:

Which spatial concepts and skills are covered by the activity?

Spatial concepts:

Primitives: Identity/Name ☐ Location ☒ Space/Time ☐

Simple: Distance ☒ Direction ☒ Connectivity ☐ Movement ☐

Boundary ☐ Shape/Area ☐ Adjacency ☐

Difficult: Overlay ☐ Buffer ☐ Topology ☐ Coordinate ☒

Map ☒ Scale ☐ Shortest Path ☐ Navigation ☐

Surface ☐ Slope/Gradient ☐ Aspect ☐ Contour ☐

Complex: Interpolation ☐ Map Projection ☐ Spatial Dependency ☐

Other:

Spatial skills:

- ☒ Map literacy
- ☒ Navigation/orientation
- ☐ Estimating distances and directions
- ☐ Recognizing and understanding patterns/Understand and identify models of spatial organization
- ☐ Select an ideal location based on the given spatial features

- [x] Visualization
- [ ] Understand and identify spatial correlations/ dependencies
- [ ] Categorize spatial entities/ geographic features and identify hierarchies
- [ ] Compare spatial entities and draw analogies among them
- [x] Identify/determine connections/relations
- [x] Understanding scale in space and time
- [ ] Delineation of spatial regions/ zones based on given features/ properties

Short Description

Navigation/orientation: Finding one's way in unfamiliar environments, interpreting and giving walking and driving directions.
Estimating distances and directions: Measure paths, weighted distances, angles.
Map literacy: Using, interpreting/understanding, learning from, and communicating acquired spatial knowledge from maps, comprehension of geographic features represented as points, lines, or polygons.
Recognizing and understanding patterns/Understand and identify models of spatial organization. Delineation of spatial regions/zones based on given features/properties: Regionalization processes, pattern recognition and clustering identification in the 2d and/or the 3d world.
Select an ideal location based on the given spatial features: Single or multi-criteria siting and optimal areas identification.
Visualization: Visualizing spatial entities from written/oral verbal descriptions, from their 2d or graphical representations or through mental transformations; such as axis rotation or perspective taking.
Understand and identify spatial correlations/ dependencies: The ability to realize, identify and explain patterns, clusters and relevant spatial dependencies.
Categorize spatial entities/geographic features and identify hierarchies: Identify the hierarchical form of data and gradients between spatial entities.
Compare spatial entities and draw analogies among them: Calculate and compare different geometric objects' shapes, area and, boundaries.
Identify/determine connections/relations: The ability to identify links and common characteristics among spatial entities and between humans and spatial entities.
Understanding scale in space and time: The understanding of changes/transitions through space and time for different spatio-temporal scales.

Geospatial concepts and spatial abilities documentation (see Section 3.2):
http://www.gosteam.eu/wp-content/uploads/2021/05/GOSTEAM_IO1_A1_final.pdf

Description of the activity in detail

Classroom activities & Online activities

1) Watch this Youtube Video: https://www.youtube.com/watch?v=FEKFRV29Sk4
   It explains longitudes and latitudes and the correlation to timezones and coordinates. After watching it, it is necessary to clear questions and repeat the heard information in class.

2) Use a Globe: Show a globe in class and let them see the graticule. They should find out which cities have approx. the same longitude and latitude as Vienna, which city is the nearest to the pole,….

3) Fill out the test (blank test) in an e- learning tool, called Moodle. It controls itself and the students can try it several times till they know every answer.

Our earth is embraced by a

○fictive ○real ○unknown

net, called _____. Because of it every location on earth has exact coordinates. We need them to

○cook ○use telephones ○use GPS to navigate

.

The net is devided in longitudes and latitudes. The longitude zero is called zero-meridian or prime meridian. It goes through the city

○Greenwich ○Manchester ○Liverpool

in (write down the country!) _____. It divides the earth in an eastern and western part and go from pole to

○Prime Meridian ○Pole ○Equator

. Overall

○360 ○180 ○90

longitudes exist-

○90 ○45 ○180

each east and west. Longitudes are also important for the

○Timezone ○Climatezone

. Every _____ degrees is a one hour time difference. The prime merdian also marks the

○great Timezone ○basic line timezone ○last timezone

also called GMT

○Golden Meal Time ○Greenwich Mean Time ○Grest Miiddle Time

. Vienna is at GMT

○-1 ○+1 ○0

. All latitides have different lenghts. The longest is the {

○equator ○polar circle ○tropic circle

It is also the latitude, that devides the earth in a northern and a southern hermisphere. There are

○90 ○180 ○60

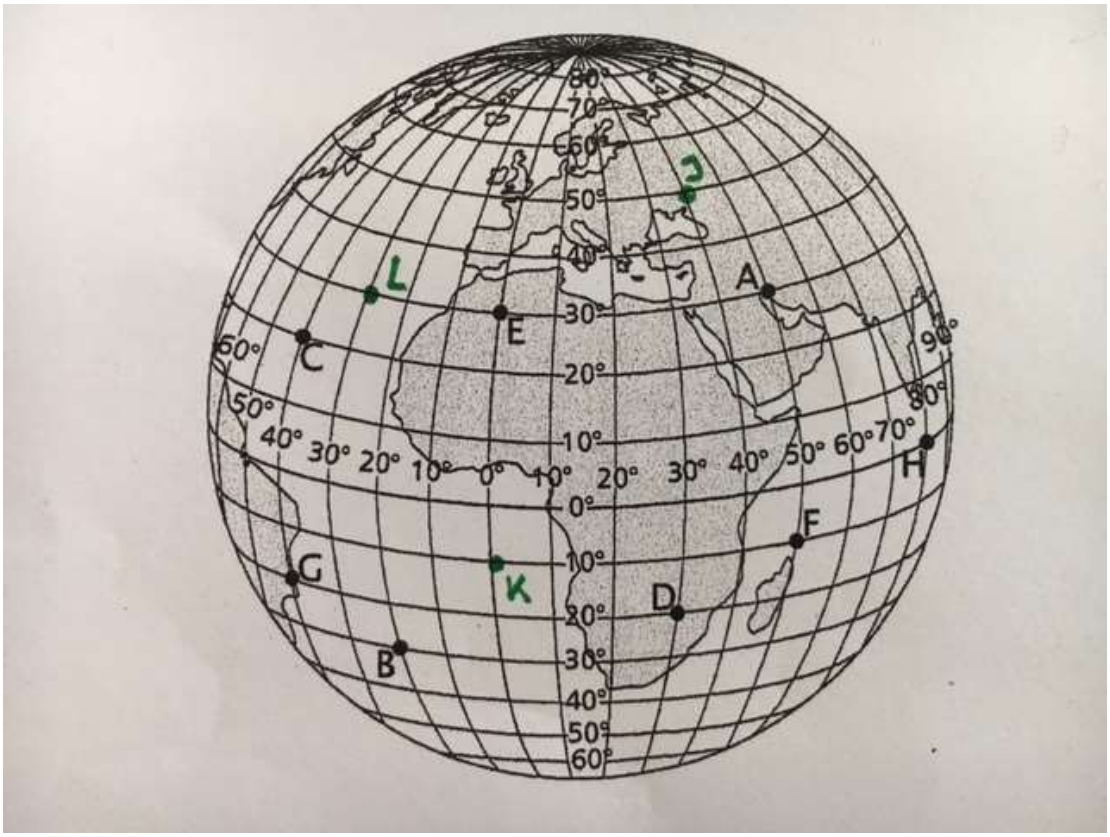
latitides each north and south. At which latitude you live is important for the

○weather ○time ○climate

Correct answers:

fictive – earth graticule – use GPS to navigate – Greenwich - Great Britain – Pole – 360 - 180 – timezone – 15 – basic line timezone – Greenwich Mean Time - +1 – equator – 90 – climate

4) With the following worksheet the students should find the correct longitudes and latitudes for the marked letters and write them down. To have a better orientation it is necessary to mark the equator and the zero meridian by coloring it in the graphic.



Correct answers:

A: 30°N, 50°E	B: 30°S, 20”W	C: 20°N, 40°W	D: 20°S, 30° E	E: 30° N, 0° E/W
F: 10°S, 50°E	G: 20°S, 40°W	H: 0°N/S, 80°E		
J: 50°N, 40°E	K: 10°S, 0° E/W	L: 30°N, 30°W		

!! They could also use a minus before the south/west coordinates. !!

5) The students get this worksheet to work in pairs.

Worksheet Coordinates and Google Maps

- ✓ Open Google Maps and search for your school.
- ✓ Click directly on the name of the school in the map and click right. Then you will see the exact coordinates of your school. Why do they have decimal digits?
- ✓ Search for further locations, like your home address, favourite hotel, sightseeing spots,..
  Write down the correct coordinates of your spots.
- ✓ Now search for coordinates, that come to your mind in google maps and find the exact locations/cities. Write them down like the following: 12.83923 1.84174
  For southern and western coordinates use a minus before the number.
  Where are your spots?
- ✓ If you still have time, download the app "Phyphox" on your smartphone and click an "Standort". There you can find your which coordinates your location has and also the sea level.

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References (if any):

Assessment (if any):