



The coordinate plane

from the Esri GeoInquiries™ collection for Mathematics

Target audience – Geometry learners

Time required – 15 minutes

Activity

Points on the surface of the earth can be plotted using a coordinate system made from lines of longitude and latitude.

Math Standards

CCSS: MATH.HSG-GPE.B.4. Use coordinates to prove simple geometric theorems algebraically.
CCSS: MATH.HSA-CED.A.2. Create equations that describe numbers or relationships.
CCSS: MATH.HSA-REI.D.10. Represent and solve equations and inequalities graphically.

Learning Outcomes

- Students will set up a coordinate plane.
- Students will plot points using a coordinate plane.

Map URL: <http://esriurl.com/mathGeoInquiry7>



Engage

How is the globe set up like a coordinate plane?

- Click the link above to launch the map.
- Click Bookmarks, and select Overview.
- ? How is the globe set up like a coordinate plane? [*Longitude and latitude coordinates allow us to plot locations on a globe.*]



Explore

Where is the origin on a globe?

- With the Details button depressed, click the button, Content.
- Click the checkbox to the left of the layer name, Prime Meridian.
- Read aloud: “The Prime Meridian is at 0 degrees longitude on the map.”
- Turn on the layer, Equator.
- Read aloud: “The equator is 0 degrees latitude on the map. The point where these two lines cross is labeled as the origin on a coordinate plane.”
- Turn on the layer, Origin.
- ? Where is the origin on a globe or map? [*In the Atlantic Ocean in the Gulf of Guinea, off the west coast of Africa.*]



Explain

How do you plot locations on a globe?

- Read aloud: “From the origin, positive longitude values move to the right (east) and negative values move to the left (west) of the prime meridian. Longitude values act like X values on a coordinate plane. From the origin, positive latitude values move up (north) and negative values move down (south) from the equator. Latitude values act like Y values on a coordinate plane.”
- ? What are the approximate coordinates for your school? [*Answers will vary.*]

Elaborate

What are the largest and smallest longitude and latitude values that you can plot on a globe?

- ? What are the maximum and minimum values of longitude? [*Longitude values increase/decrease to either positive (east) or negative (west) 180 degrees.*]
- ? Where on the map is 180 degrees longitude? [*This north-south line runs through the middle of the Pacific Ocean on the map.*]
- ? What is the name of this line? [*The International Date Line*]
- ? What are the maximum and minimum values of latitude? [*Latitude values increase/decrease to either positive (north) or negative (south) 90 degrees.*]
- ? What points are located at +90 degrees and -90 degrees, respectively? [*North Pole and South Pole*]

Evaluate

Where is that?

- *Tip: Type the respective (longitude, latitude) values into the search window in the top right of the map to map coordinates.*
- ? What country is located at (-19, 65)? [*Iceland*]
- ? What country is located at (175, -41)? [*New Zealand*]
- ? What country is located at (84, 28)? [*Nepal*]
- ? What country is located at (-65, -34)? [*Argentina*]

USE THE MEASURE TOOL

- Click Measure, select the Distance button, and from the drop-down list, choose a unit of measurement.
- On the map, click once to start the measurement, click again to change direction, and double-click to stop measuring.
- Hint: Position the area of interest on the map so that it is not obscured by the Measure window.

LEGENDS, LAYERS, AND SYMBOLS

- To the left of the map, click Details and then click the Show Contents Of Map button. The Contents pane allows you to turn on and off layer visibility.
- Press the Legend button. The Legend pane allows you to identify symbols.
- On the map, click symbols for more information that will appear in a pop-up box.

Next Steps

DID YOU KNOW? ArcGIS Online is a mapping platform freely available to public, private, and home schools. A school subscription provides additional security, privacy, and content features. Learn more about ArcGIS Online and how to get a school subscription at <http://www.esri.com/schools>.

THEN TRY THIS...

- Using a free ArcGIS Online organizational account for schools (<http://connected.esri.com>), have students modify the map used in this activity and save it to their accounts, sharing it with classmates.

TEXT REFERENCES

This GIS map has been cross-referenced to material in sections of chapters from these high school texts.

- *Holt Geometry by Holt, Rinehart & Winston — Chapter 1*
- *Geometry by Houghton Mifflin — Chapter 13*
- *Geometry by Moise & Downs — Chapter 13*