Running hot and cold

from the Esri GeoInquiries™ collection for World Geography

Target audience – World geography learners **Time required – 15 minutes**

Activity	Explore how latitude, elevation, and proximity to the ocean influence temperature patterns in the world's tropical, temperate, and polar zones.
World Geography Standards	**C3:D2.Geo.1.6-8.** Construct maps to represent and explain the spatial patterns of cultural and environmental characteristics. **C3:D2.Geo.2.6-8.** Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions, as well as changes in their environmental characteristics.
Learning Outcomes	• Describe the characteristic of yearly and monthly global temperature patterns. • Analyze the effects of latitude, elevation, and proximity to the oceans on global temperature patterns.

Map URL: http://esriurl.com/worldGeoInquiry2

Ask

What is the pattern of annual global temperatures?

→ Click the link above to launch the map.
→ With the Details button depressed, click the button, Show Contents.
→ In the Contents pane, pause your pointer over the layer name, Average Yearly Temperature.
→ Click the button, Show Legend.
– The symbols on the map represent cities around the world. The color of each symbol reflects an average of temperatures recorded throughout the year in that city (in degrees Celsius).
? Using the legend and the colored dots on the map, describe the global temperature patterns displayed on the map. *[Answers will vary but may include: Temperatures steadily decrease as you go from the Equator toward the North Pole. There are many cities with low temperatures in the Northern Hemisphere but none in the Southern Hemisphere.]*

Acquire

How does latitude affect temperature around the globe?

→ Turn on the layer, Climate zones.
– The areas between the major latitude lines represent five zones of latitude.
? Why do you think that there are no major cities in the North or South Polar Zones? *[The temperatures are probably too cold to support major cities.]*
? How is the North Temperate Zone different from the South Temperate Zone? *[Answers will vary but may include: There is more land area in the North Temperate Zone. There are cities with average temperatures below 13°C in the North Temperate Zone but none in the South Temperate Zone.]*

Explore

How do monthly temperature patterns in the Southern and Northern Hemispheres compare?

→ In the Northern and Southern hemispheres, click two green dots.
? What do you observe in the January and July temperatures for those cities? *[Patterns in the Southern Hemisphere are similar to those in the Northern Hemisphere, but the warmest and coldest months are reversed.]*

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Analyze

How does elevation affect global temperature patterns?

→ Click the five cities that are very near or at the Equator.
? What temperature patterns do these five cities have in common? *[They show very little range in monthly temperatures throughout the year (3° or less).]*
? What do you notice about the temperature of those five cities? *[Quito is significantly cooler than the other four cities.]*
? Scrolling to the bottom of the pop-up window for the five cities on the Equator, what is different about the cities? *[Quito is at a significantly higher elevation and thus has a cooler temperature.]*

Act

How does proximity to the ocean affect temperature?

→ Using the search field, search for and click the cities of London, Amsterdam, Berlin, and Kiev. (See the *Search by Location* ToolTip below for details.)
? Noting the January temperature for each city, what happens to the winter temperatures as you move from London to Kiev? *[Winter temperatures get steadily colder as you move east and inland. Close proximity to the ocean contributes to warmer temperatures.]*

SHOW LAYER LEGEND

- To the left of the map, click Details and then click Content.
- Turn on the layer whose legend you want to view.
- At the top of the pane, click the Show Map Legend button.
- Note: You can view the legend for multiple layers at one time by turning on layers in the Contents pane first.

SEARCH BY LOCATION

- In the Find Address Or Place (search) field, type a place name or keyword.
- Choose a search result that appears below the field or click the Search button.

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...

• In the Contents pane, turn on the Average Yearly Temperature layer, and then click the Filter button.
• Create a query to find the average yearly temperature where (attribute query) ELEV_M Is Greater Than **999**.

TEXT REFERENCES

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

- *World Cultures and Geography by McDougal Littell*
- *My World Geography by Pearson*

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