



The Left-Handed Chocolate Caper

Hise Penn traveled the world in search of exotic foods. Two weeks ago, he called his office with exciting news. He found a variety of cocoa bean whose molecules formed opposite the usual way. This "left-handed bean" was actually much more nutritious and had all the flavor of a regular cocoa bean. He was excited about creating a new brand of chocolate products. Much to his surprise, Penn had been followed by a rival scientist, whose henchmen grabbed Penn and held him captive, hoping to steal his discovery. Penn was permitted to write a brief note home, indicating he was safe but would be held until he cooperated. "Just don't try to tell them where you are," his captors said.

Penn had a plan. He knew his family was smart and had great mapping skills and software. By listening to the henchmen talk, he could tell they were not good geographers. Penn thought he could identify his location and fool the captors. So he wrote:

I'm fine, and my friends should not worry, nor try to find me. In this land of more than 10 million people, it would not be possible. But the steep mountains out my window are pretty, and I can see signs of two different types of faults. The land is dry, probably less than 400 mm precipitation each year, so my cell is not damp. These January days get warm but the nights are mild, maybe 15 degrees; if I'm still here in 6 months, temperatures will be in the single digits, so I hope this is resolved before then. At least my fate is better than those in the nearby city of ~~XXXXXXXXXX~~, where they lost many lives after a 7+ magnitude quake some years ago, and are not yet to a quarter million. But I'm tired of being held, and eating fish every day.

"Thought you could trick us, did you? Well, I scratched out the city name and those silly clues about temperature won't save you!" snapped a captor.

In spite of the captor's efforts, when the note arrived, Penn's friends could make out either "Am" or "An" at the start of the city name, but the rest of the word was unreadable. While listening intently to the letter, Penn's young daughter screamed with delight, ran to the computer and started her GIS. In minutes she exclaimed, "I found Daddy! Let's go get him!"

Where is Penn, so the world can experience this amazing chocolate find?

Name: _____ Class: _____ Date: _____

Where is Penn?

Instructions for ArcGIS Online

Launch your internet browser, go to <http://bit.ly/1eNwoQ5>. Refer to Penn's note, list the geographic clues. Use them to narrow down the location to one specific spot. As you eliminate areas of the globe, zoom to the area of interest.

Clues

There are nine geographic clues. What are they?

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.

1. What major city is he near?
2. Of what mountain range is Penn admiring?
3. What country is he in?
4. What is his **approximate** location?
 - a. Latitude _____
(North or South)
 - b. Longitude _____
(East or West)

Questions

Name: _____ Class: _____ Date: _____

Where is Penn?

Instructions for ArcGIS Explorer Desktop

Launch ArcGIS Explore Desktop, open **choc_caper.nmf**. Refer to Penn's note, list the geographic clues. Use them to narrow down the location to one specific spot. As you eliminate areas of the globe, zoom to the area of interest.

Clues

There are nine geographic clues. What are they?

10.

11.

12.

13.

14.

15.

16.

17.

18.

Questions

5. What major city is he near?

6. Of what mountain range is Penn admiring?

7. What country is he in?

8. What is his **approximate** location?

a. Latitude _____
(North or South)

b. Longitude _____
(East or West)

Name: _____ Class: _____ Date: _____

Where is Penn?

Instructions for ArcMap (9.x or higher)

Launch ArcMap, open `choc_caper.mxd`. Refer to Penn's note, list the geographic clues. Use them to narrow down the location to one specific spot. As you eliminate areas of the globe, zoom to the area of interest.

Clues

There are nine geographic clues. What are they?

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.

Questions

1. What major city is he near?
2. Of what mountain range is Penn admiring?
3. What country is he in?
4. What is his **approximate** location?
 - a. Latitude _____
(North or South)
 - b. Longitude _____
(East or West)

Teacher Information

Time: 20 minutes

Grade Levels: 5-12

Curriculum Connections: Math, Science, English Language Arts, Social Studies, Technology, Geography
Setup and Use:

ArcGIS Explorer Online (AGXO): No software required! Just use your internet browser with Microsoft Silverlight plugin installed. Access AGXO at <http://explorer.arcgis.com>.

Software: ArcGIS Explorer Desktop (AGX) (Virtual Globe software available at www.esri.com/arcgisexplorer) or you may use ArcGIS 9.x or higher.

Layer Packages: The layer package is available at www.arcgis.com, search all content for “chocolate.” The layer package is named, *Chocolate Caper.lpk*. You can open this file in ArcGIS Explorer Desktop or ArcGIS 10.x. (Layer Package file online: <http://www.arcgis.com/home/item.html?id=98b351aa4a204cd88d3579a369857c39>)

Options:

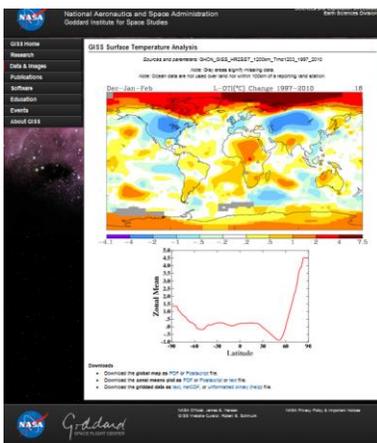
- After you launch, **ArcGIS Explorer Desktop (AGXD)**, you may have students:
 - Add Content, *Chocolate Caper.lpk*, and change the basemap to *Boundaries and Places*.
 - Open the *choc_caper.nmf* file, which already contains the layer package and basemap. Be sure that the *.nmf file is in the same directory (folder) as the *.lpk file.
- After you launch, **ArcGIS 9.x**, open *choc_caper.mxd*.
- After you launch, **ArcGIS 10.x**, add the layer package to the map view.

Once you have downloaded all the parts you need, be sure the software is installed. Then be sure you have saved the files that students need in a place that is accessible to all students.

Documents and Data: The entire lesson document, map document and data in one zip file is available from www.barbareeduke.com/downloads/downloads.htm or at ArcLessons (www.esri.com/arclessons, search for “Duke”) There are student handouts for AGX and ArcGIS. **Additionally**, you may want students to **add a search area** to the map **with the drawing tools or buffer tool**. They could print their maps and share their reasoning for their decision.

Insight from the Classroom:

- Remember that the virtual globe basemap is streaming over the internet; therefore, no internet = no map.
- After 10 minutes if many students are having difficulty, narrow the scope for them. Ask them about the **temperature**, “If it’s warm in January and cool in July, are they north or south of the equator?”



- The students could do some temperature mapping at: <http://data.giss.nasa.gov/gistemp/maps/>. (Picture shown to left)
- You also might allow them to do research online about **cocoa beans** to make a more educated guess. Some suggested sites:
 - <http://inventors.about.com/od/foodrelatedinventions/a/chocolate.htm>
 - <http://www.ehow.com/cocoa-beans/>
- Also, you may find it helpful for students to work in **teams** of 2-3.

Extension: Create your own “caper.” Students love puzzles. Have them create their own story and map puzzle for their classmates to solve. There are many intriguing data sets available to create some terrific stories!

Where is Penn? **Answer Key**

Clues

There are nine geographic clues. What are they?

1. **Near mountains**
2. **dry land/Not much rain**
3. **Warm in January**
4. **Cold in July**
5. **Near city An... or Am...**
6. **Major quake > 7**
7. **Eating fish daily**
8. **faults**
9. **population 10 million**

Questions

1. What major city is he near?
Antofagasta
2. Of what mountain range is Penn admiring?
ANDES Mountains
3. What country is he in?
CHILE
4. What is his **approximate** location?
 - a. Latitude **23.38 S**
 - b. Longitude **70. 23 W**(Be kind, the coordinates could vary slightly and still give a reasonable location... “close enough!”)

