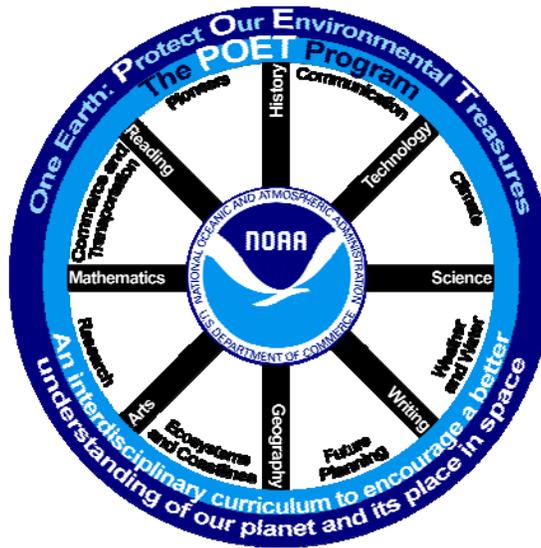


Topography and Bathymetry

Category
 Geography,
 Mathematics, Science,
 History

Real World Connection
 Ecosystems, Research



Materials
 Pencil
 Graph Paper
 (Included)

Problem Question

How does the elevation of the highest peak on Earth compare to the lowest ocean depth on Earth?

**Prior Knowledge
 What I Know**

Based on your prior knowledge, answer the problem question to the best of your ability.

**Conclusion
 What I Learned**

Answer the problem question after completing the activity.

Background

The Earth's crust is constantly moving. As a result, the **topography** and **bathymetry** of our planet are always changing. These changes are usually slow, on the order of centimeters or less per year. Because of these constant changes, the latitude, longitude, elevation, and depth for exact features (peaks and trenches) also changes.

The highest peak on Earth is Mt. Everest, located in eastern Nepal, near the border with Tibet, in the **Himalayan Mountain Range**, which runs from northwest to southeast along northern India and through Nepal. It was named in 1865 after Sir George Everest, the British Surveyor-General of India. **The lowest ocean depth on Earth is called the Challenger Deep** and is located beneath the western Pacific Ocean - Philippine Sea in the southern end of the **Mariana Trench**. The Mariana Trench runs roughly north - south about 1700 km due east of the Philippines and several hundred km southwest of the United States island of Guam. It was named after the British survey ship Challenger II, which first surveyed the trench in 1951.

FYI – Definitions

Topography – the study of Earth's surface features – for purposes of this activity, it specifically involves the recording/study of the planet's relief or terrain above sea level.

Bathymetry - the study of Earth's underwater features – for purposes of this activity, it specifically involves the recording/study of the planet's water depth below sea level.

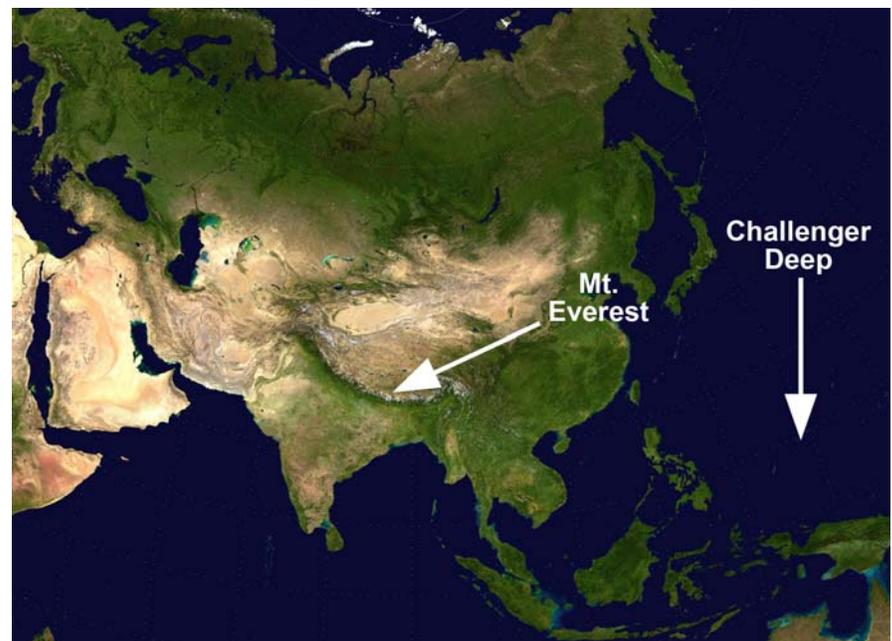
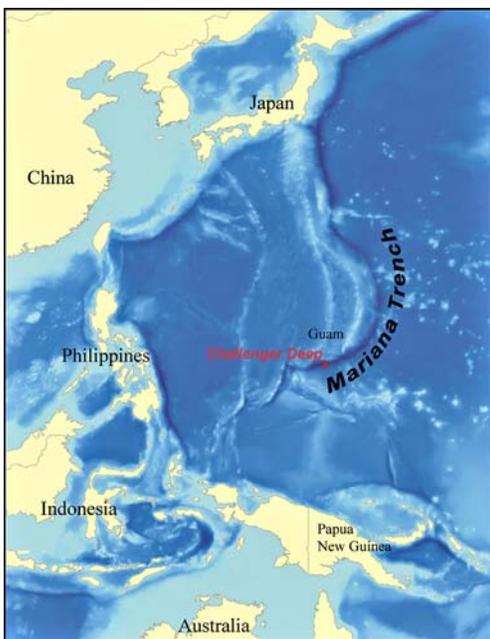
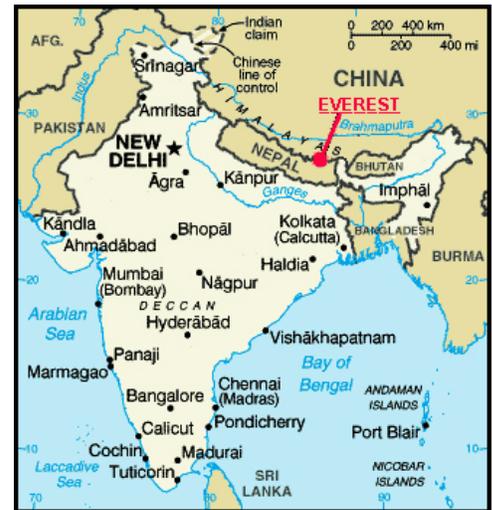
FYI

Other names for Mt. Everest

Chomolungma – General Tibetan Language
Sagarmatha – General Nepalese Language
Deodungha – Local Area Nepalese Language
Shengmu Feng – Simplified Chinese Language

FYI

The lowest ocean depth is about 6325 m east southeast of the highest peak.



For this activity, you will use current average or estimated values for latitude, longitude, elevation, and depth to graph elevations and depths versus longitudes at the given latitude of Mt. Everest - Himalayan Mountain Range and the given latitude of the Challenger Deep - Mariana Trench.

Procedure - Part 1

To graph the elevation of Earth's highest peak, Mt Everest in the Himalayan Mountain Range, follow these steps.

1. Using Figure 3-1, along the x-axis (horizontal) at the bottom of the figure, number the longitude values from 86.0 to 88.0 in increments of 0.1. To help you get started, the first few numbers are done for you.
2. Label the x-axis "Longitude in Degrees East".
3. Using Figure 3-1, along the y-axis (vertical) on the left side of the figure, number the elevation values from 0 to 10,000 in increments of 500. Start at the bottom (the figure frame) and work up. To help you get started, the first few numbers are done for you.
4. Label the y-axis "Elevation in Meters".
5. Using the data from Table 3-1, plot the points on Figure 3-1.
6. Connect each point to construct your line graph.
7. Write a title for your graph.

Longitude (Degrees East)	86.0	86.1	86.2	86.3	86.4	86.5	86.6
Elevation (Meters)	3544	4370	2681	4648	6546	5972	4879
Longitude (Degrees East)	86.7	86.8	86.9	87.0	87.1	87.2	87.3
Elevation (Meters)	5152	5192	8593	5997	6322	4595	4439
Longitude (Degrees East)	87.4	87.5	87.6	87.7	87.8	87.9	88.0
Elevation (Meters)	3316	4223	5053	4932	5914	5508	6442

Table 3-1. Mt. Everest – Himalayan Mountain Range – 28 Degrees North Latitude – Longitude and Elevation Data.



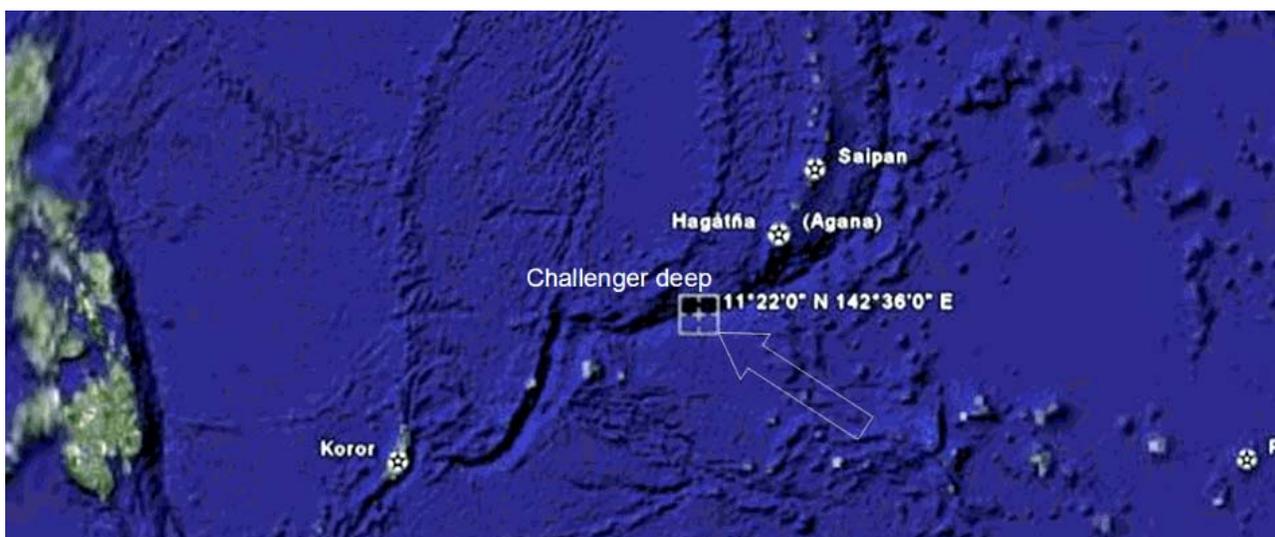
Procedure - Part 2

To graph the depth of the lowest point in the ocean, the Challenger Deep in the Mariana Trench – western Pacific Ocean, follow these steps.

1. Using Figure 3-2, along the x-axis (horizontal) at the bottom of the figure, number the longitude values from 144.0 to 146.0 in increments of 0.1. To help you get started, the first few numbers are done for you.
2. Label the x-axis “Longitude in Degrees East”.
3. Using Figure 3-2, along the y-axis (vertical) on the left side of the figure, number the depth values from 0 to -10,000 in increments of 500. Since you are graphing depth, start with zero at the top tick mark and work down. To help you get started, the first few numbers are done for you.
4. Label the y-axis “Depth in Meters”.
5. Using the data from Table 3-2, plot the points on Figure 3-2.
6. Connect each point to construct your line graph.
7. Write a title for your graph.

Longitude (Degrees East)	144.0	144.1	144.2	144.3	144.4	144.5	144.6
Depth (Meters)	-6448	-6307	-8030	-8281	-8898	-8998	-10187
Longitude (Degrees East)	144.7	144.8	144.9	145.0	145.1	145.2	145.3
Depth (Meters)	-10102	-9618	-9754	-9064	-8671	-8263	-7700
Longitude (Degrees East)	145.4	145.5	145.6	145.7	145.8	145.9	146.0
Depth (Meters)	-7245	-7228	-6937	-6735	-6423	-6219	-5865

Table 3-2. Challenger Deep – Mariana Trench – 12.1 Degrees North Latitude – Longitude and Depth Data.



Title: _____

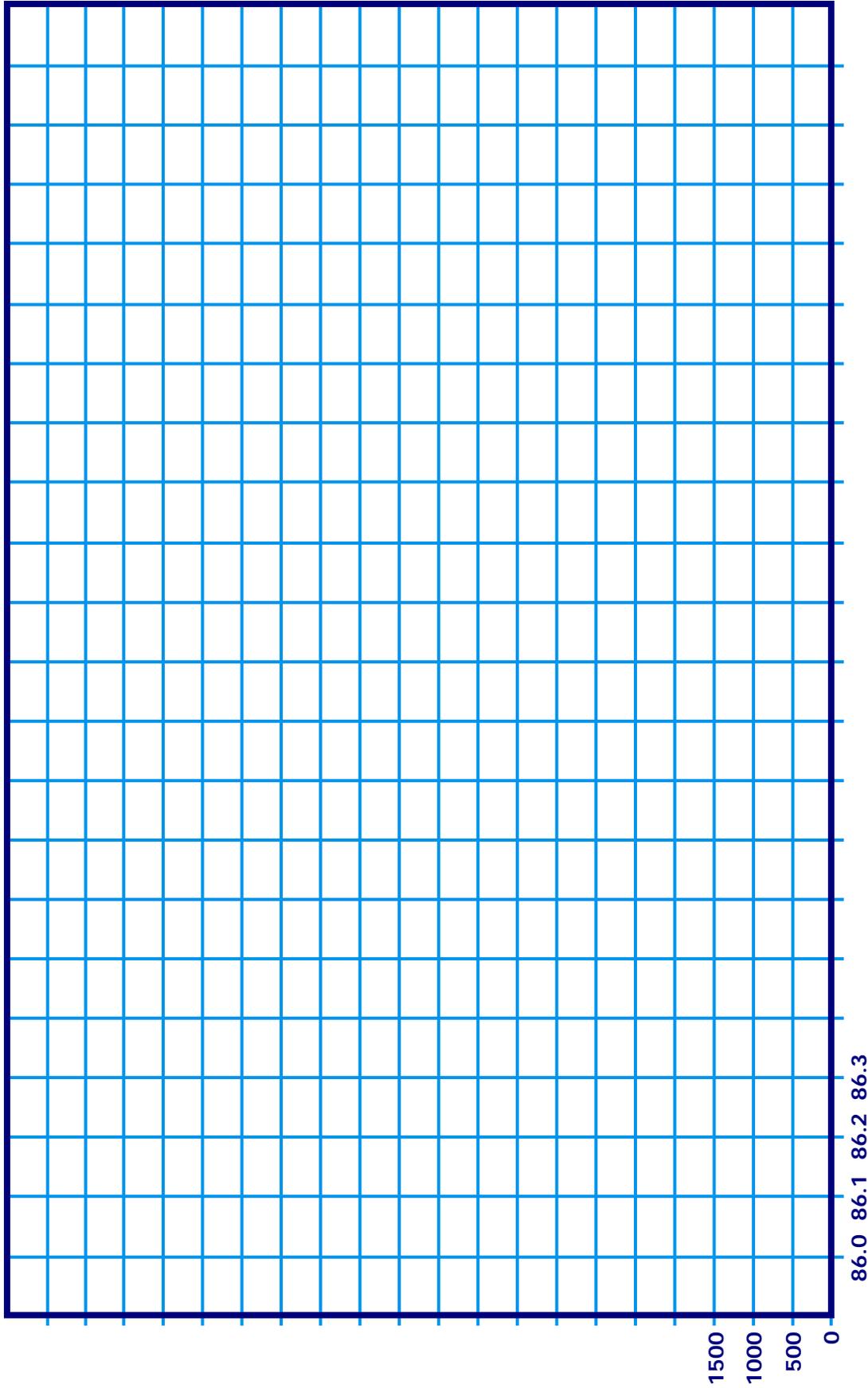


Figure 3-1. Graph Template for Plotting Mt. Everest – Himalayan Mountain Range Longitude and Elevation Data.

Title: _____

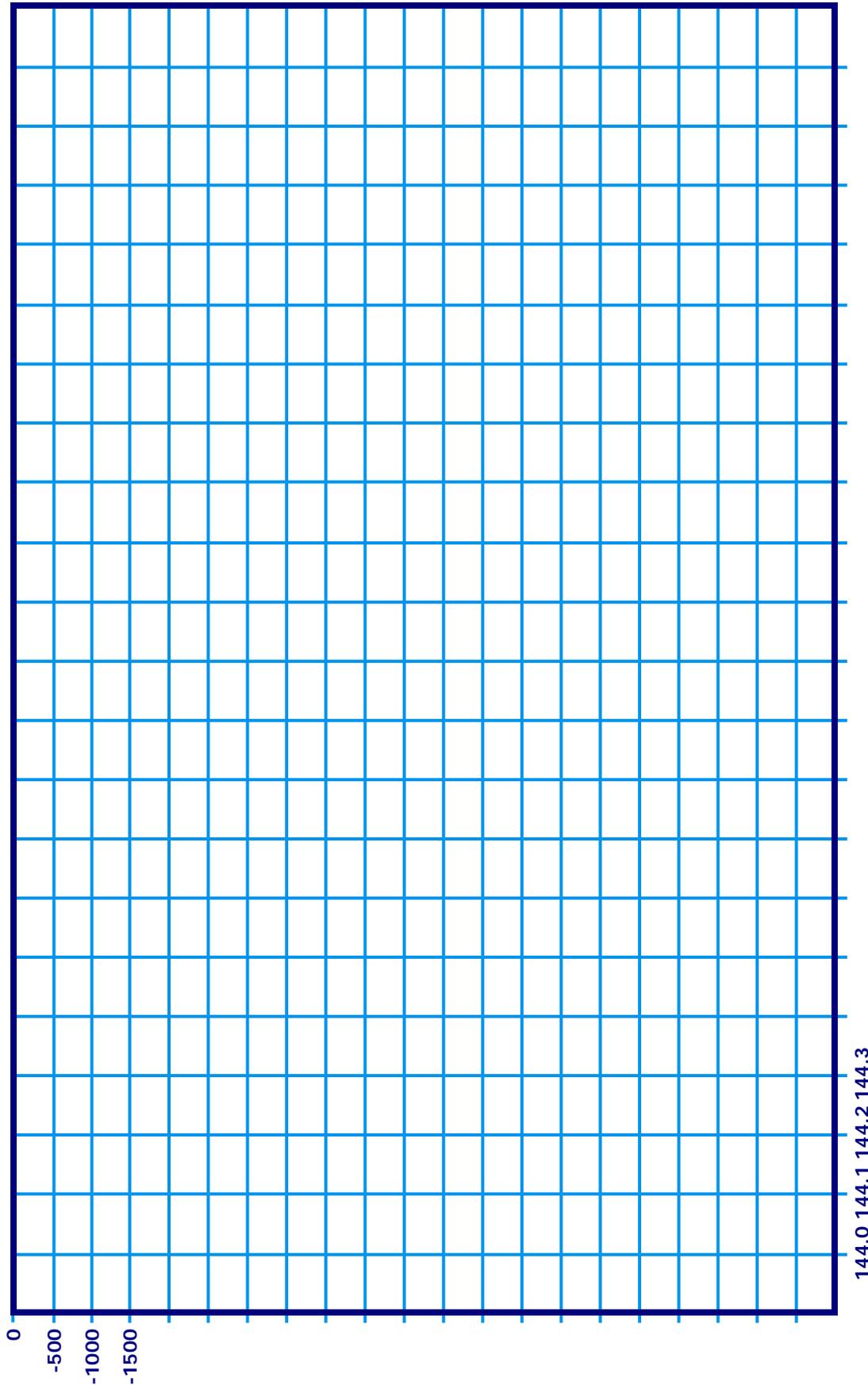


Figure 3-2. Graph Template for Plotting Challenger Deep – Mariana Trench Longitude and Depth Data.

Questions

1. Define topography and bathymetry.

2. When measured from sea level, which is greater - the highest mountain peak on the Earth's surface or the lowest depth in the Earth's oceans?

3. After you decide which is greater - the highest peak or the lowest depth - calculate the difference.

4. In the box below, draw a bar graph to compare and contrast the parts of Earth's topography and bathymetry provided in Table 3-3.

(Hint: the ocean's depths will be below your horizontal line and the land elevations will be above the line.)

Feature	Elevation Above/ Depth Below Sea Level
Challenger Deep – Mariana Trench	10,187 Meters Below Sea Level
Average Ocean Depth	3,730 Meters Below Sea Level
Average Land Elevation	870 Meters Above Sea Level
Mt. Everest – Himalayan Mountain Range	8,593 Meters Above Sea Level

Table 3-3. Feature and Elevation Above/Depth Below Sea Level for Graphing

Maps and photographs in this activity courtesy *Wikipedia* and the following:

- > TerraMetrics, Inc.
- > Pavel Novak
- > NASA
- > Keran Barut
- > Phoenix 5
- > K. Musser

The POET Program

3-7

National Oceanic and Atmospheric Administration

