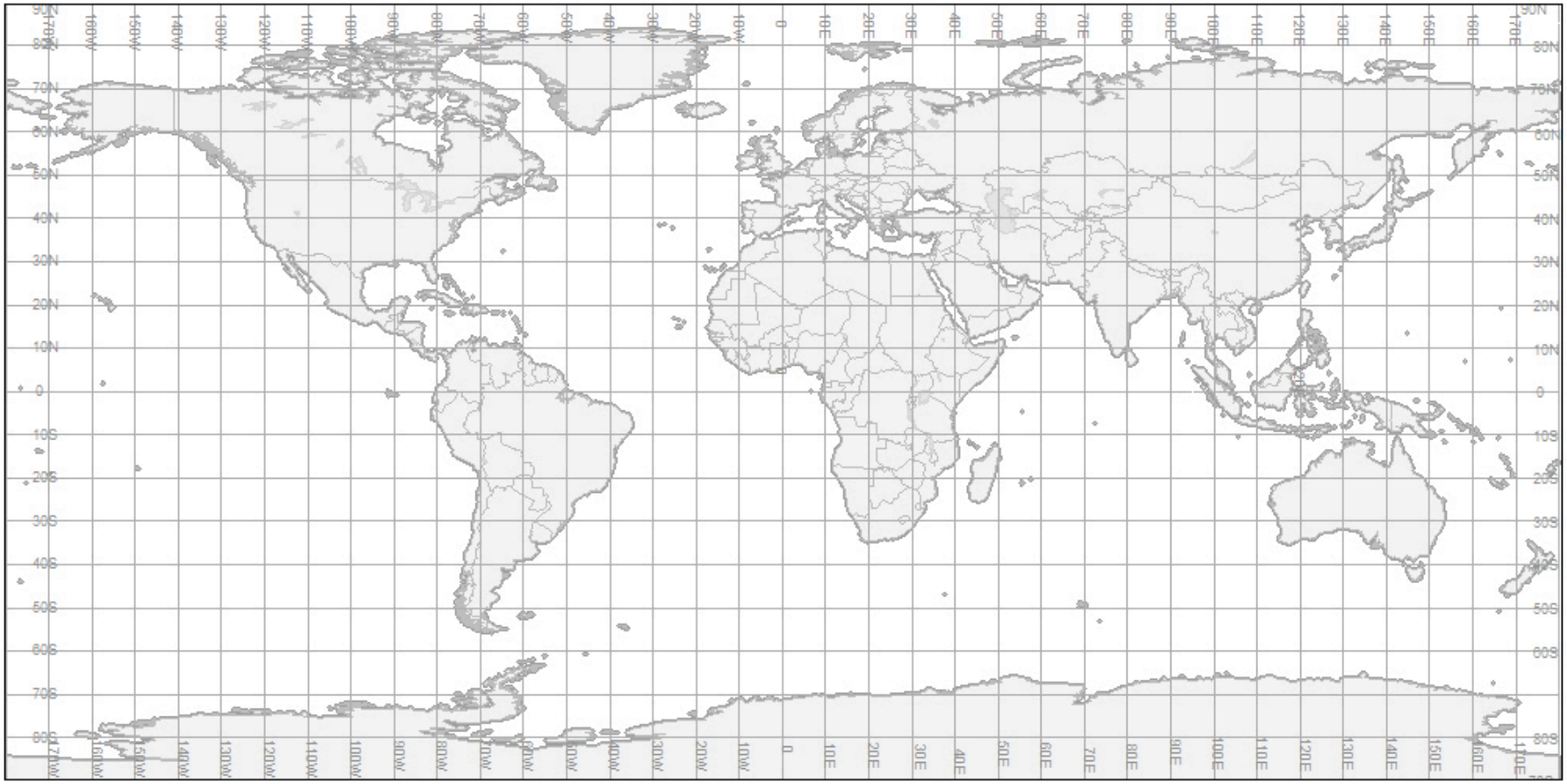
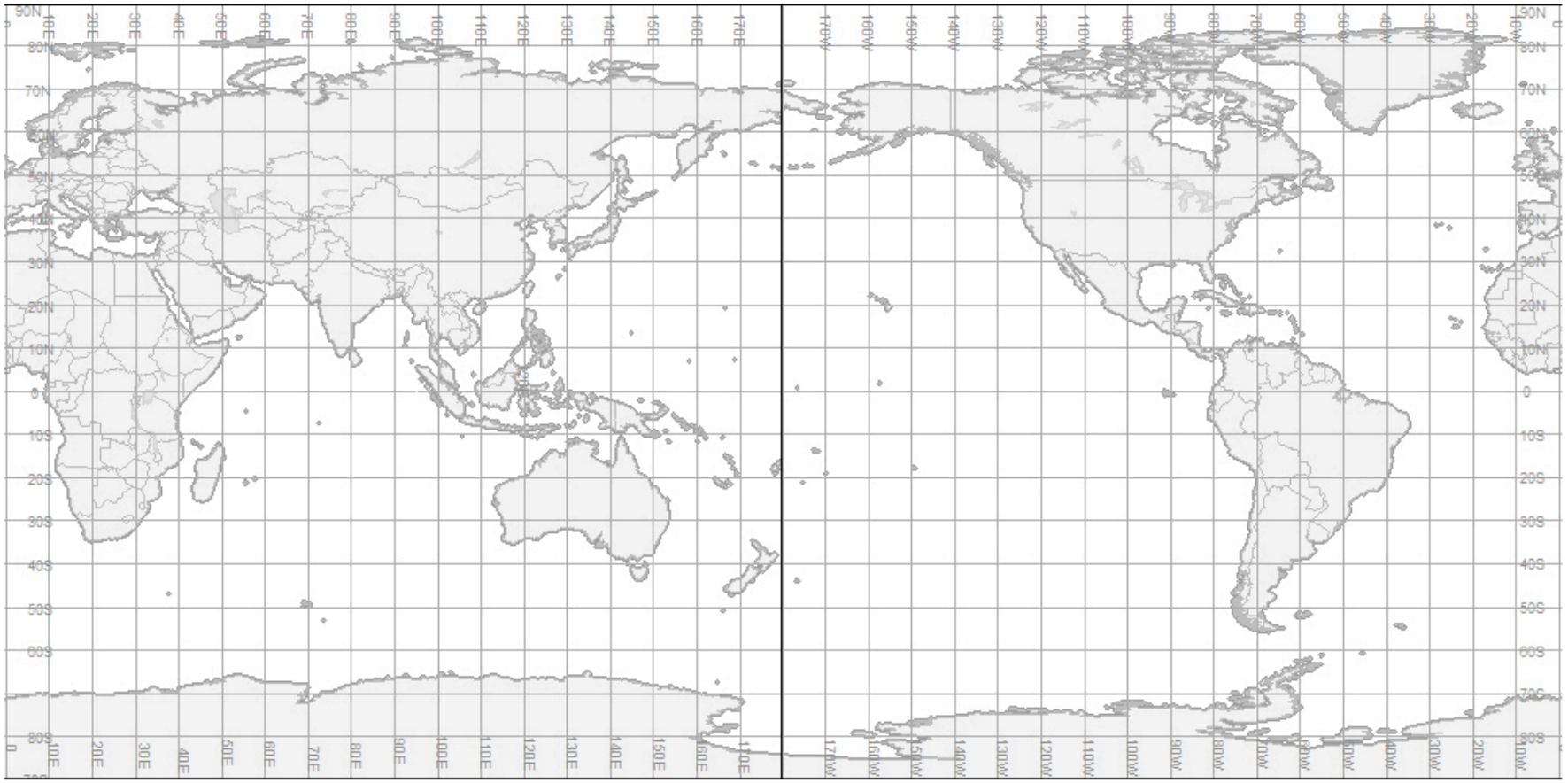
Small World Map



Small World Map (Pacific) worksheet



Name _____

Earth Structure and Processes
Picture Dictionary

_____
Word

Draw a picture for the word.

Write a definition for the word.

_____
Word

Draw a picture for the word.

Write a definition for the word.

_____
Word

Draw a picture for the word.

Write a definition for the word.

_____
Word

Draw a picture for the word.

Write a definition for the word.

Name _____

Activity 1.1: Myths and Science

Title of Myth _____

Figure It Out: *Myths and Science*

A. Where did this myth take place?

_____

B. What natural events on the Earth were the people (in the myth or who developed the myth) living through?

_____

_____

C. How did they explain these natural events in the myth?

_____

_____

_____

_____

_____

D. How would YOU explain these natural events?

_____

_____

_____

_____

_____

Name _____

Activity 1.1: Myths and Science

Reflection Questions

A. What kinds of observations about Earth did the myths explain? Give examples.

_____

_____

_____

_____

_____

B. **It's Your Turn:** Choose one of the natural phenomena explained in the stories shared in class today. Explain this phenomenon in your own words. What observations would you want to make to support your explanation?

_____

_____

_____

_____

_____

_____

_____

_____

Name _____

Breaking News!

Expert Group

Directions: Read the news article assigned to your expert group. In your group, discuss and complete the table below.

Article Title _____ Article Date _____

Publication _____

EXPERT GROUP
Describe the Event *What was the event? Where did it occur? When did it occur? How long did it last? What warning signs, if any, had there been that it was going to happen? What were things people saw or reported?*
Explain the Event *Why do you think this event is happening? Does it occur often?*
Questions about the Event *What questions do you have about the event? Were there any terms/explanations that you didn't understand? Is there something else you would like to know about the event that wasn't talked about in the article?*

Name _____

Breaking News!

Home Group

Directions: After you have returned back to your Home Group, take turns reporting back to the others the information gathered from each article. Write down any questions the group has about the event.

HOME GROUP	
Article 1 Circle One: Volcano Earthquake Location: _____ **Main Ideas:**	**Article 2** Circle One: Volcano Earthquake Location: _____ **Main Ideas:**
Explanations:	**Explanations:**
Questions:	**Questions:**

Name _____

HOME GROUP	
Article 3 Circle One: Volcano Earthquake Location: _____ **Main Ideas:**	**Article 4** Circle One: Volcano Earthquake Location: _____ **Main Ideas:**
Explanations	**Explanations**
Questions:	**Questions:**

Name _____

Activity 1.2: Breaking News!

Reflection Questions

A. Why do you think earthquakes and volcanoes happen?

_____

_____

_____

B. How often do you think earthquakes and volcanoes happen?

_____

_____

_____

C. Where do earthquakes and volcanoes happen?

_____

_____

_____

D. Do you think there is a predictable pattern? Explain your idea.

_____

_____

_____

_____

E. What questions do you have about earthquakes and volcanoes? Write one fat question and one skinny question. "Fat" questions are the ones that will help you figure out what observations you need to make to explain earthquakes and volcanoes.

_____

_____

_____

_____

Name _____

Activity 1.3: Mission and Team Introduction

Stop and Think

Looking at the *Big World Map*, where do you think earthquakes and volcanoes happen? What do you already know that helps you make that prediction?

_____

_____

_____

_____

_____

_____

Stop and Think

Answer this question after you've made your predictions.

Why do you think earthquakes and volcanoes happen?

_____

_____

_____

_____

_____

Name _____

Pen Pal Letter Reflections

Directions: Using the information found in your pen pal letter, complete the following table.

Earth Structure _____

Observations	Explanation
Describe where your earth structure is located. Give a brief physical description of your earth structure. Describe any changes happening in the region of your earth structure.	How would you explain the changes happening in the region of your earth structure?
	Questions
What are some other interesting observations about your earth structure? Does your Earth structure have a lot of seismic activity (volcanoes or earthquakes)? How do you know?	What questions do you have about your earth structure?

Name _____

Activity 1.3: Mission and Team Introduction

Reflection Questions: Part 1

It's Your Turn: Write a letter to your Junior Science Assistant. In your letter you should introduce yourself, introduce where you live, and share with your pen pal things you found interesting about his or her home region of the world.

Dear _____,

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Sincerely,

Name _____

Activity 1.3: Mission and Team Introduction

Reflection Questions: Part 2

A. From what you have heard, is the seismic activity at each earth structure or in each region similar? Explain.

_____

_____

_____

_____

_____

B. What interesting observations stood out for you? Which observations from the pen pal letters do you think will help you figure out where, when, and why earthquakes and volcanoes happen?

_____

_____

_____

_____

C. **It's Your Turn:** Write another letter to your Junior Science Assistant. In this letter, **explain** what you think is going on at that earth structure and in that region. For example, you should explain how things are moving in your region and why you think they are moving in that way.

_____

_____

_____

_____

_____

_____

Name_____

Activity 2.1: How High and How Low

Stop and Think Question

Look back at the letter from Kirima Chiqua, the Junior Scientist who lives on one of the Aleutian Islands. How did Kirima describe the Aleutian Islands? How is her description represented on the map?

_____
_____
_____
_____
_____

Reflection Question

Both the GIS and the topo maps show elevation and depth. Describe *how* each map shows elevation and depth.

_____
_____
_____
_____
_____

Name_____

Activity 2.2: Building 3-D Models

Figure It Out

Looking at your three-dimensional model of your earth structure, answer the following questions.

1. What parts would be hard to climb? Which would be the steepest slopes? Show a classmate.

_____

_____

_____

_____

2. What parts would be easy to climb? Which would be the least steep slopes? Show a classmate.

_____

_____

_____

_____

3. What differences do you notice in the shape of the land below sea level and above sea level?

_____

_____

_____

_____

4. What observations can you make about your earth structure? Using your model and your topo map, describe your earth structure. Be sure to include the elevation, depth, steepness of the slopes, and shape of your earth structure.

_____

_____

_____

Name_____

Activity 2.2: Building 3-D Models

5. Look back at the letter the Junior Science Assistant sent you. How did your pen pal describe the topography of the earth structure? Compare your description to your pen pal's description.

_____

_____

_____

_____

6. Look at other earth structure topo maps. Find a map that you think has a shape similar to your earth structure. Describe what is similar about the two structures.

_____

_____

_____

7. Look at the other earth structure topo maps. Find a map that you think has a shape different from your earth structure. Describe what is different about the two structures.

_____

_____

_____

Name_____

Activity 2.2: Building 3-D Models

Reflection Questions

Why so you think some earth structures are different from your earth structure? Do you think these other places have the same patterns of earthquakes and volcanoes?

_____

_____

_____

Name _____

Reflection Question

Do you think the two earth structures you compared have similar patterns of earthquakes and volcanoes? What makes you think that?

_____

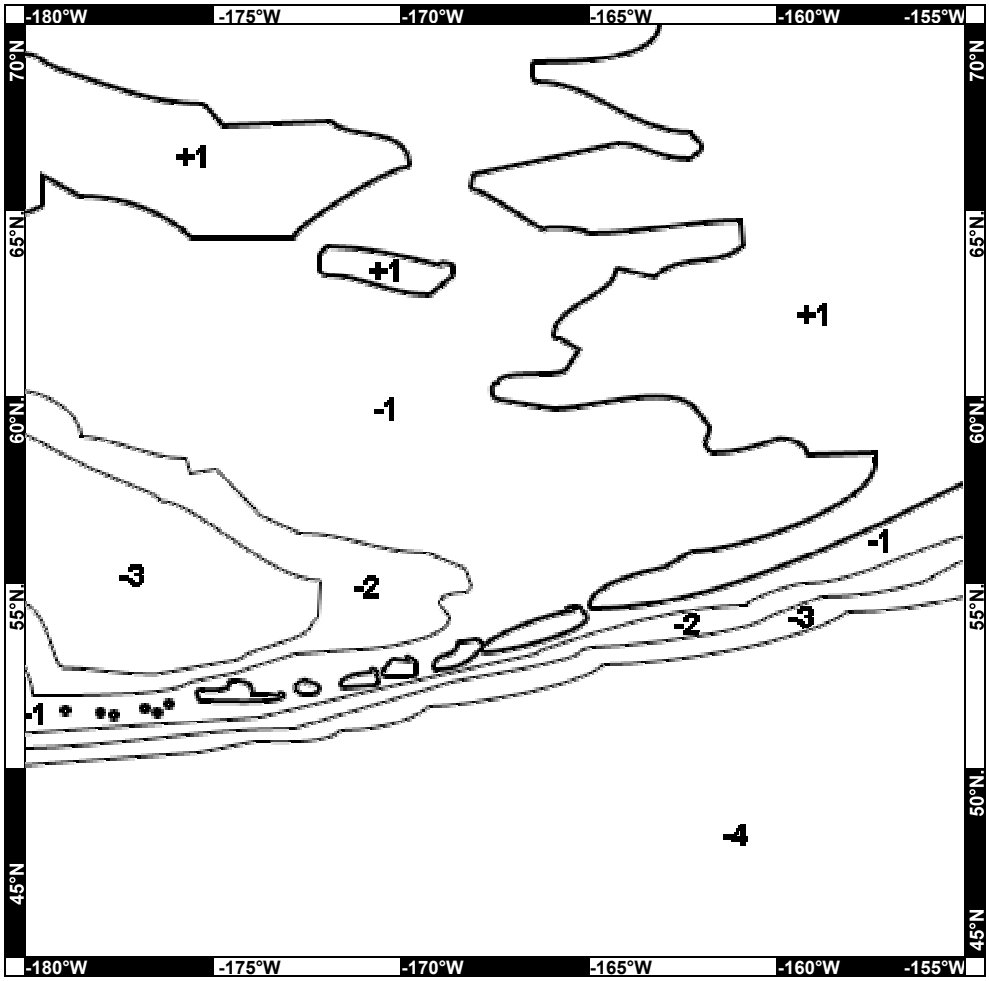
_____

_____

_____

Name _____

Aleutian Islands Cutout Topographic Map



Elevation Key: Color in each number

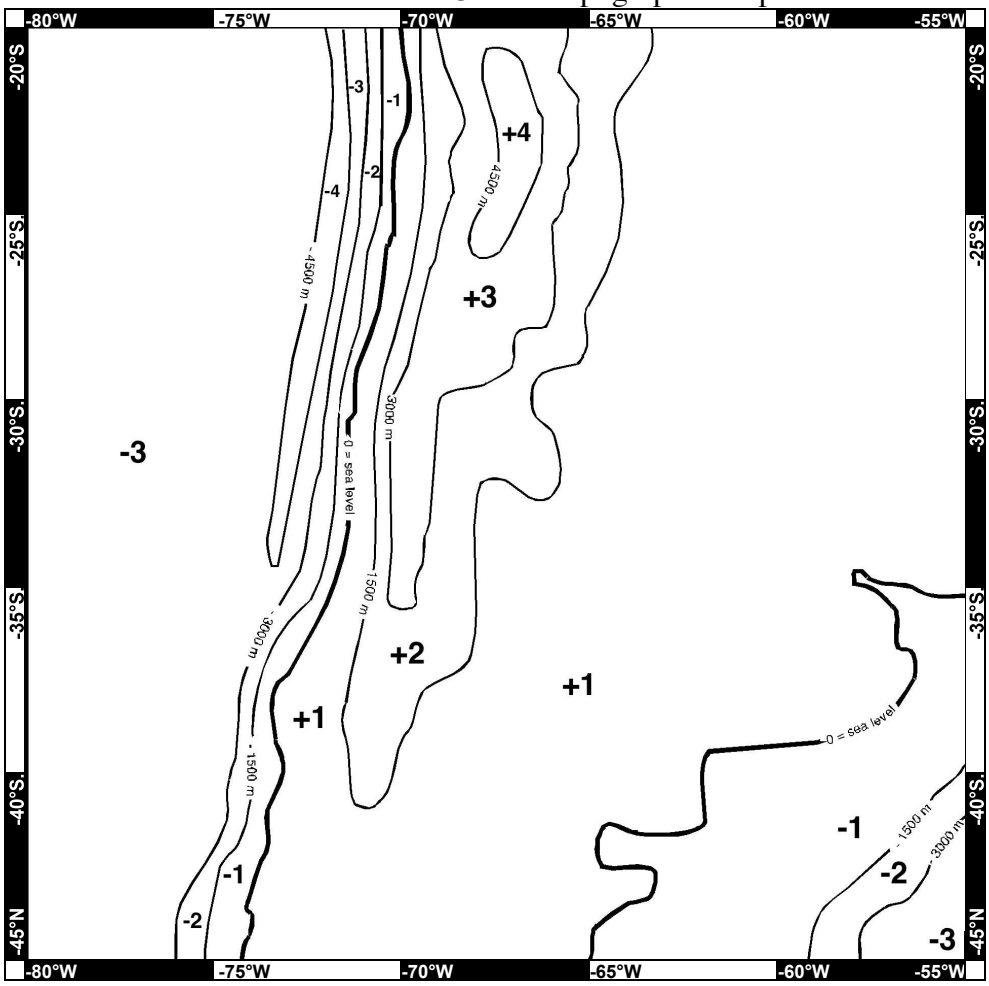
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Andes Mountains Cutout Topographic Map



Elevation Key: Color in each number

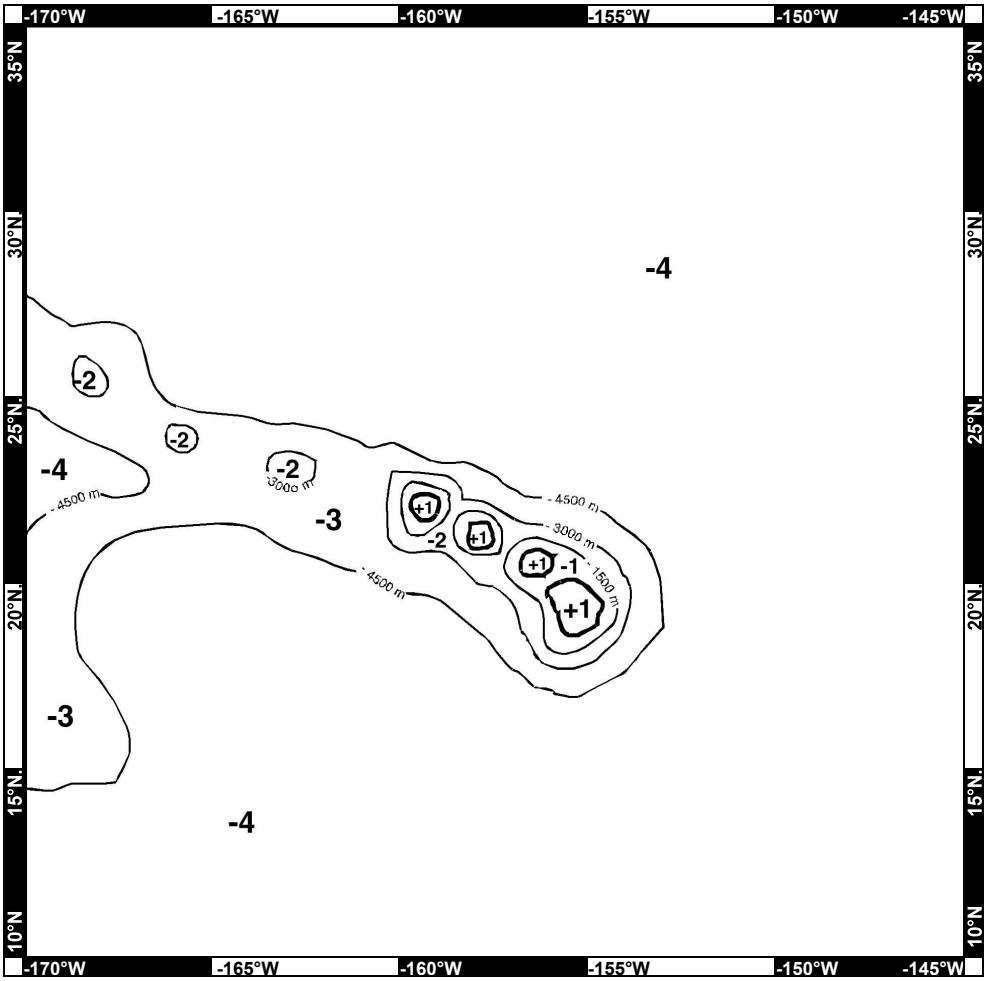
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Hawaiian Islands Cutout Topographic Map



Elevation Key: Color in each number

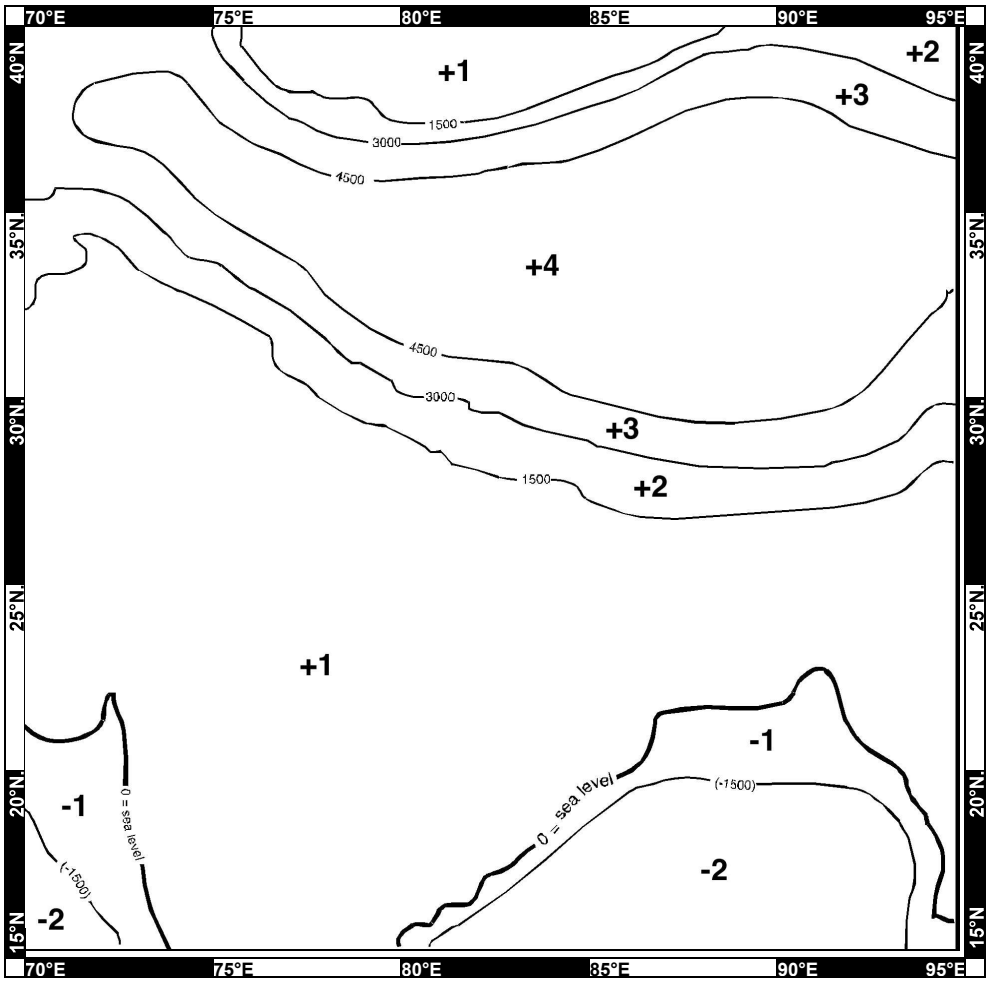
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
__	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Himalayas Cutout Topographic Map



Elevation Key: Color in each number

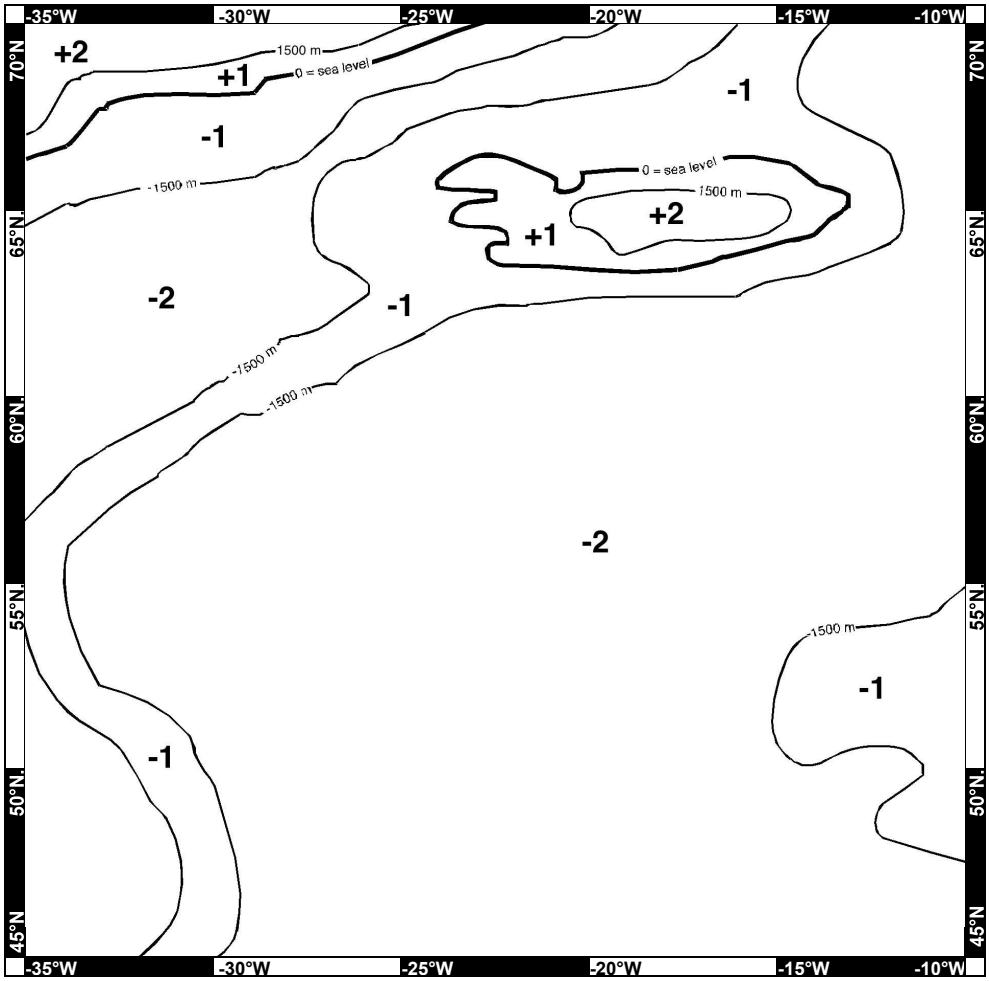
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Iceland Cutout Topographic Map



Elevation Key: Color in each number

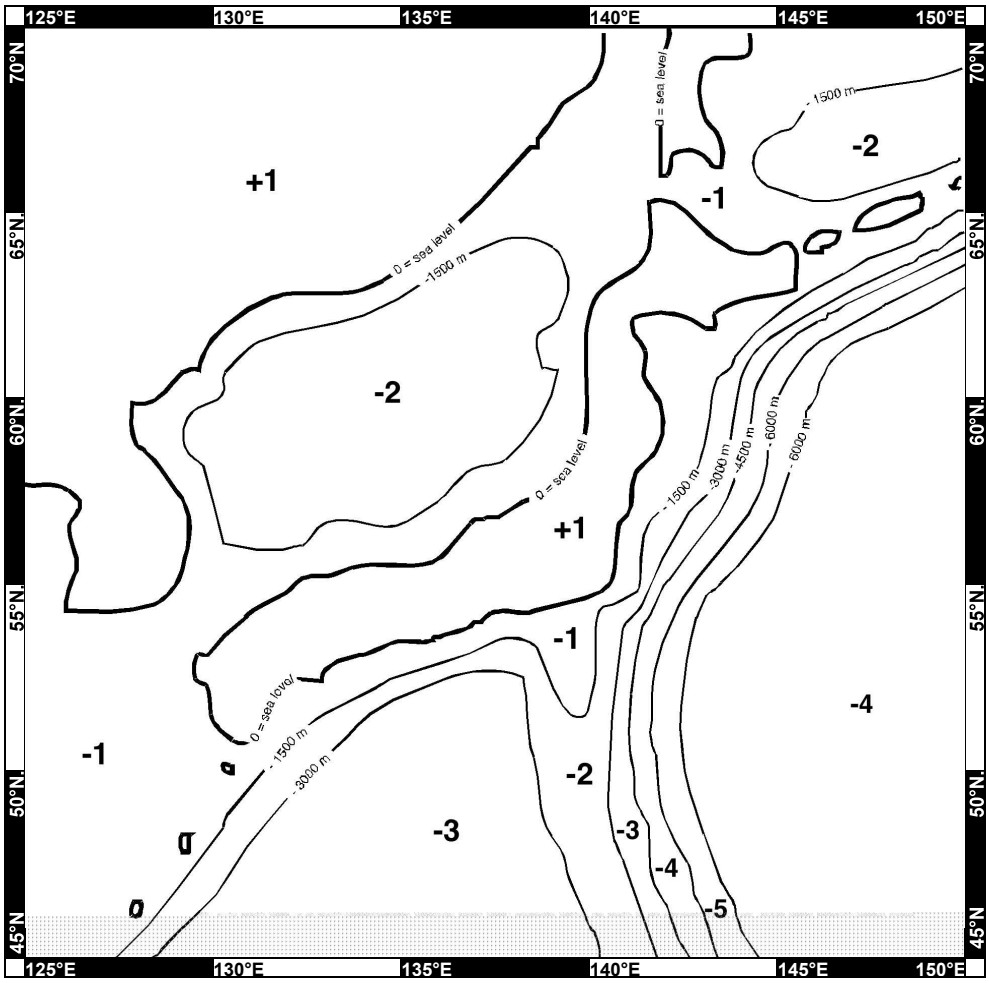
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Japan Cutout Topographic Map



Elevation Key: Color in each number

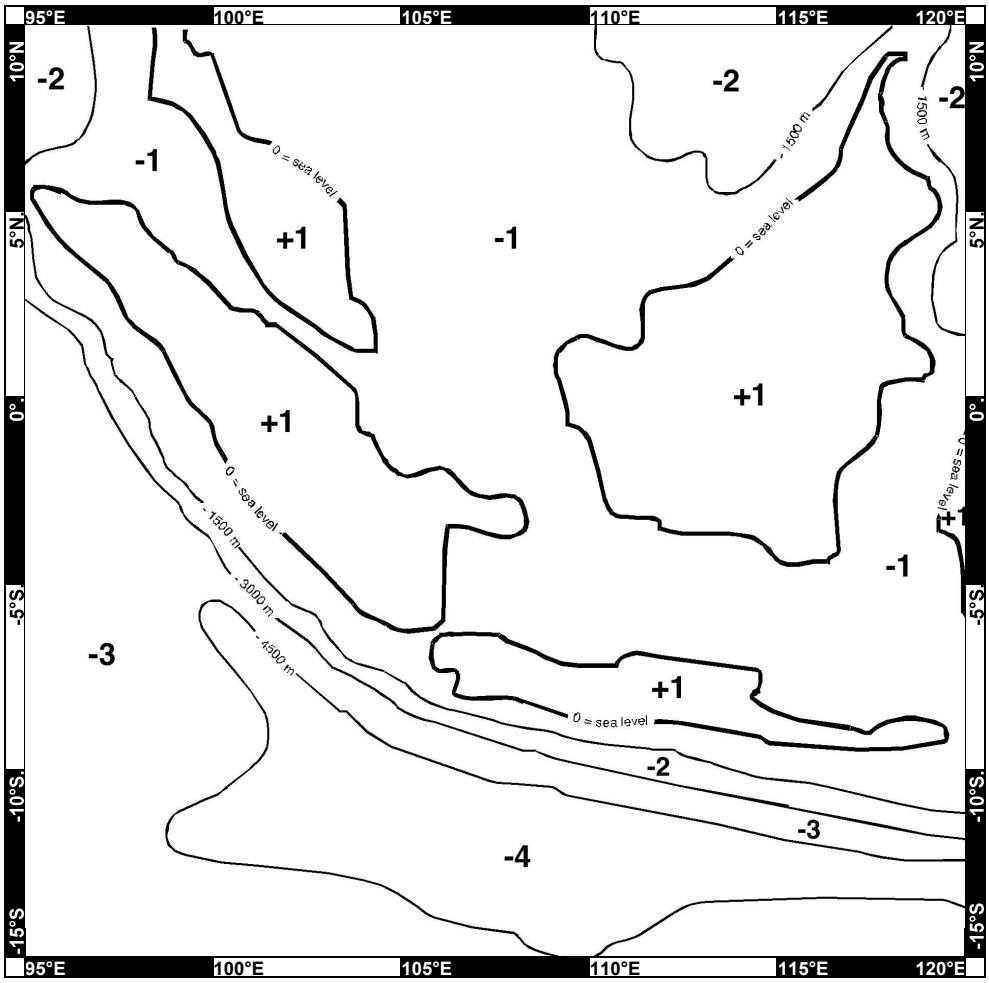
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Java Trench Cutout Topographic Map



Elevation Key: Color in each number

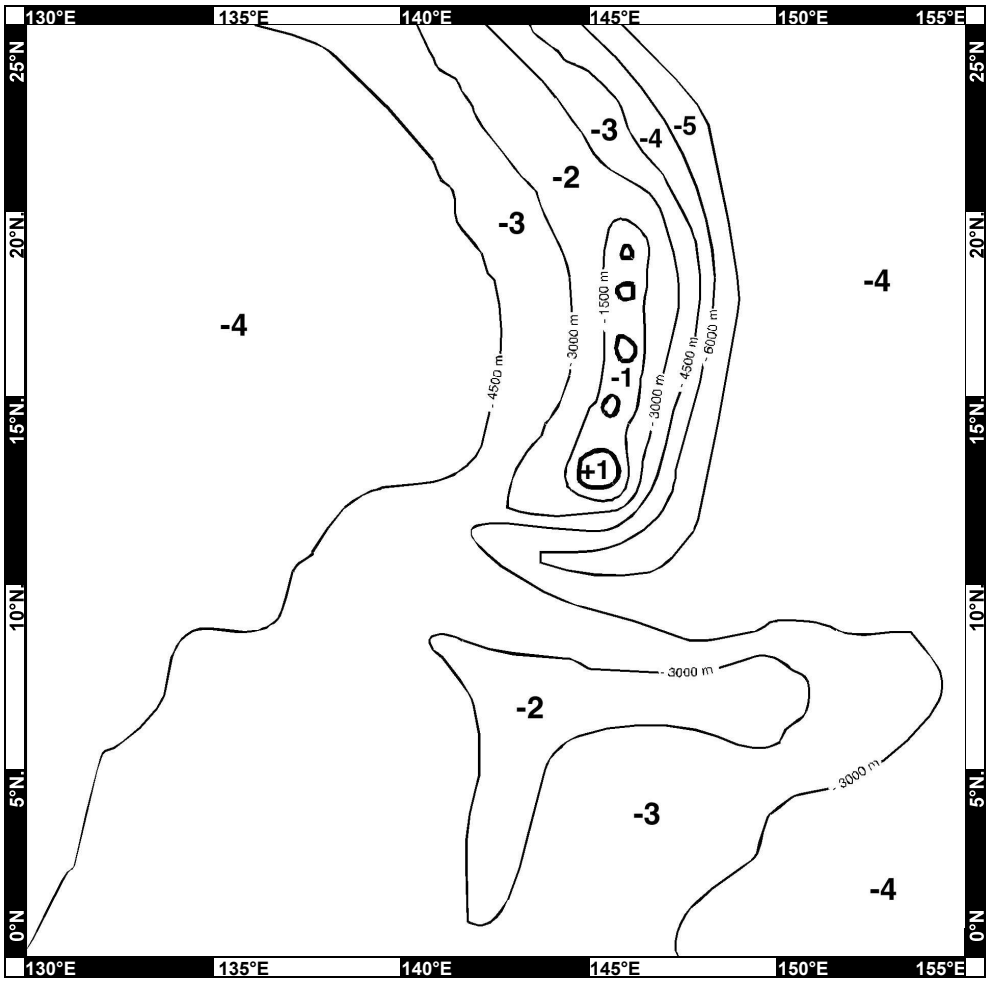
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Mariana Trench Cutout Topographic Map



Elevation Key: Color in each number

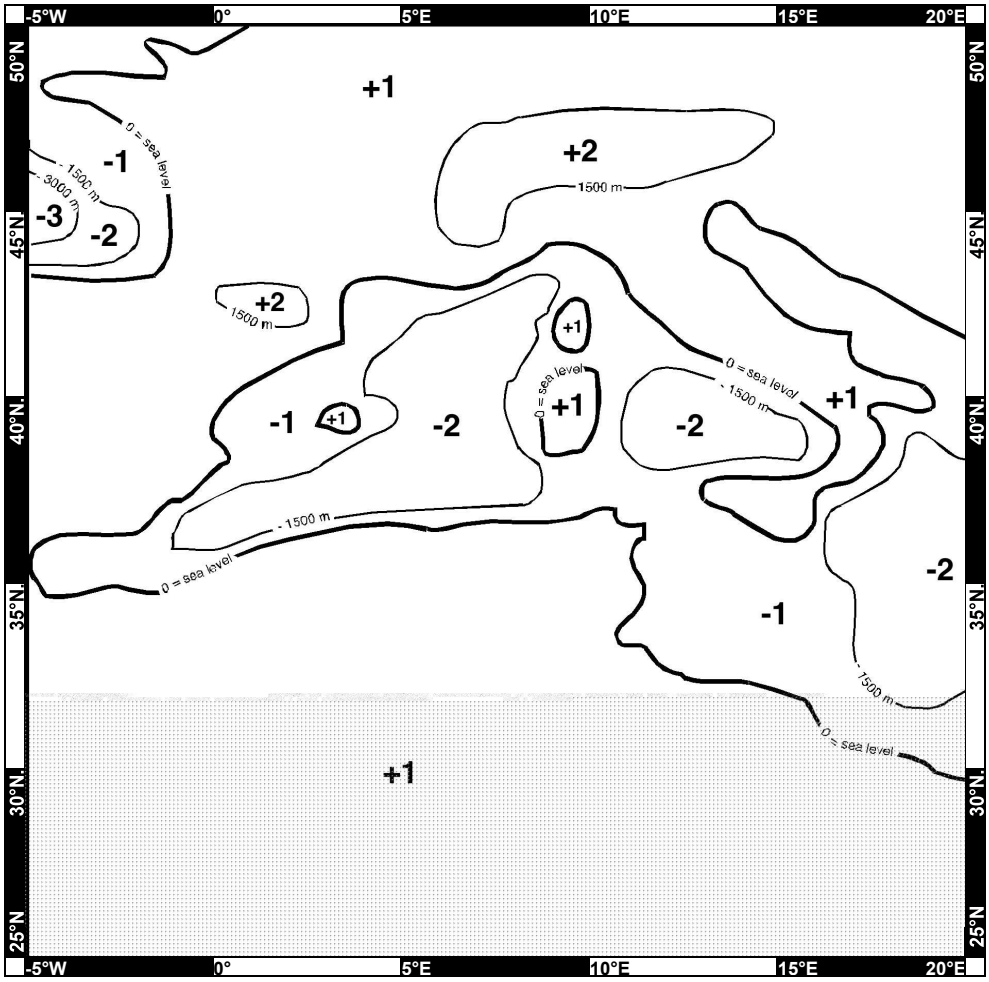
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Mt. Etna Cutout Topographic Map



Elevation Key: Color in each number

+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Mt. Kilimanjaro Cutout Topographic Map

Elevation Key: Color in each number

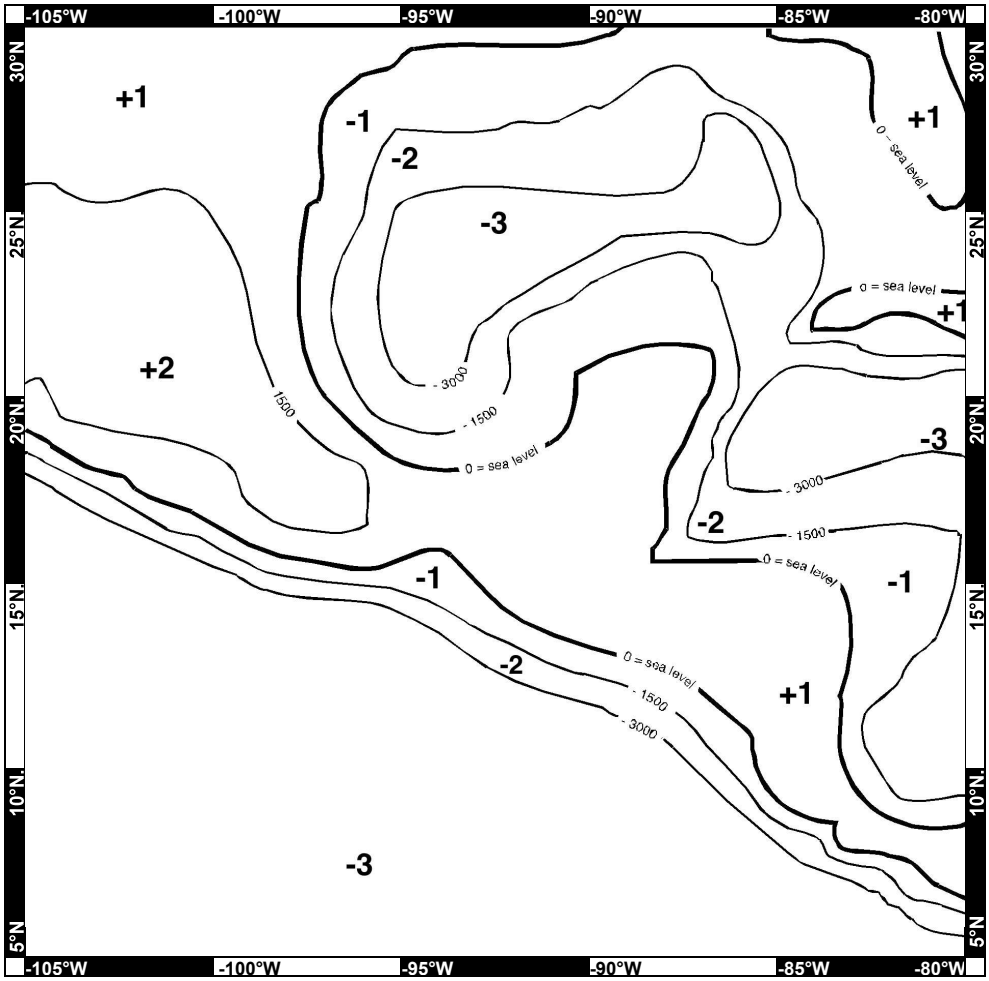
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Mt. Popocatepetl Cutout Topographic Map



Elevation Key: Color in each number

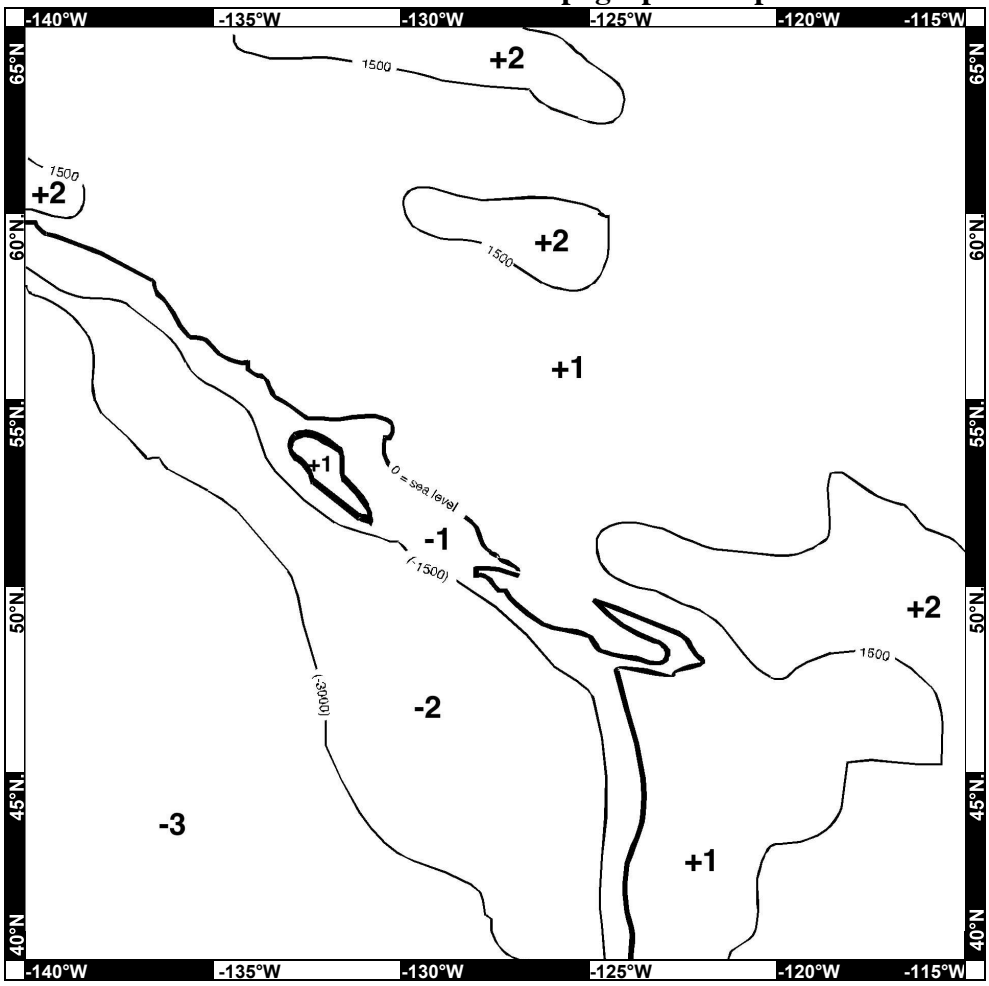
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Mt. St. Helens Cutout Topographic Map



Elevation Key: Color in each number

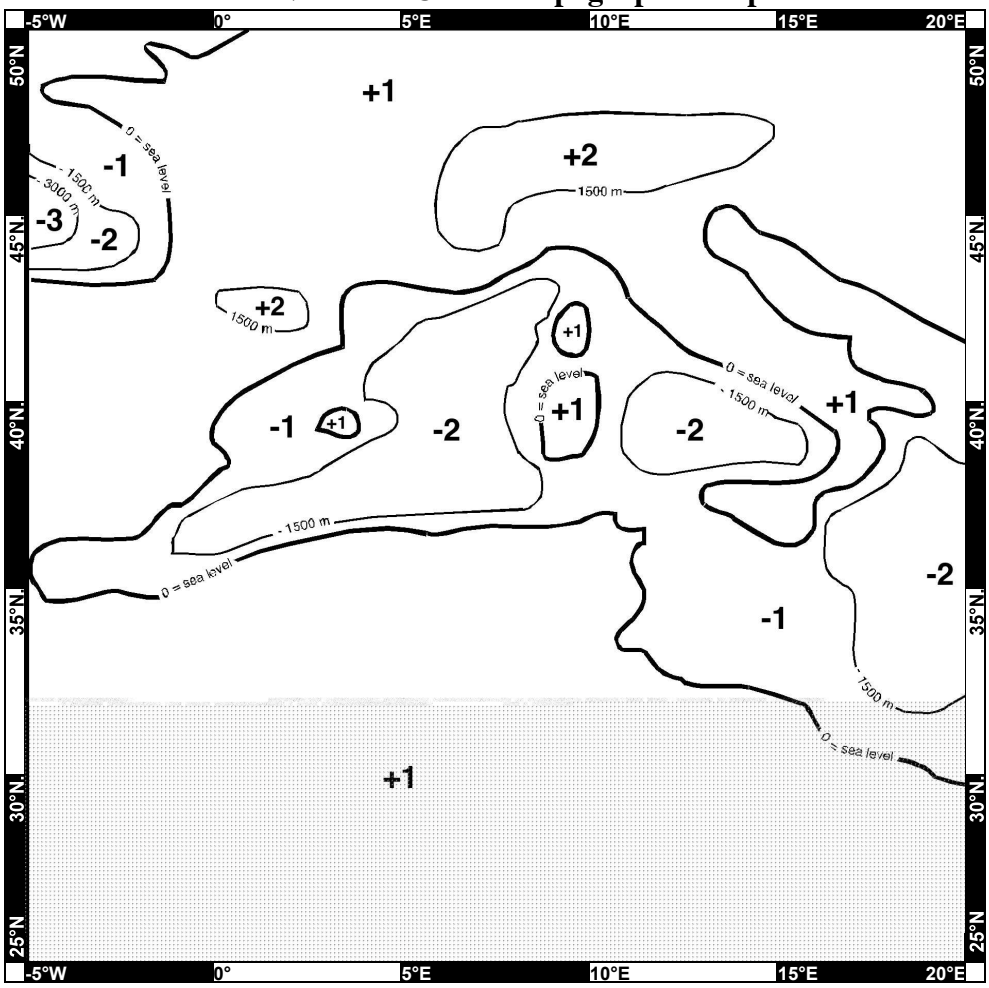
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

Mt. Vesuvius Cutout Topographic Map



Elevation Key: Color in each number

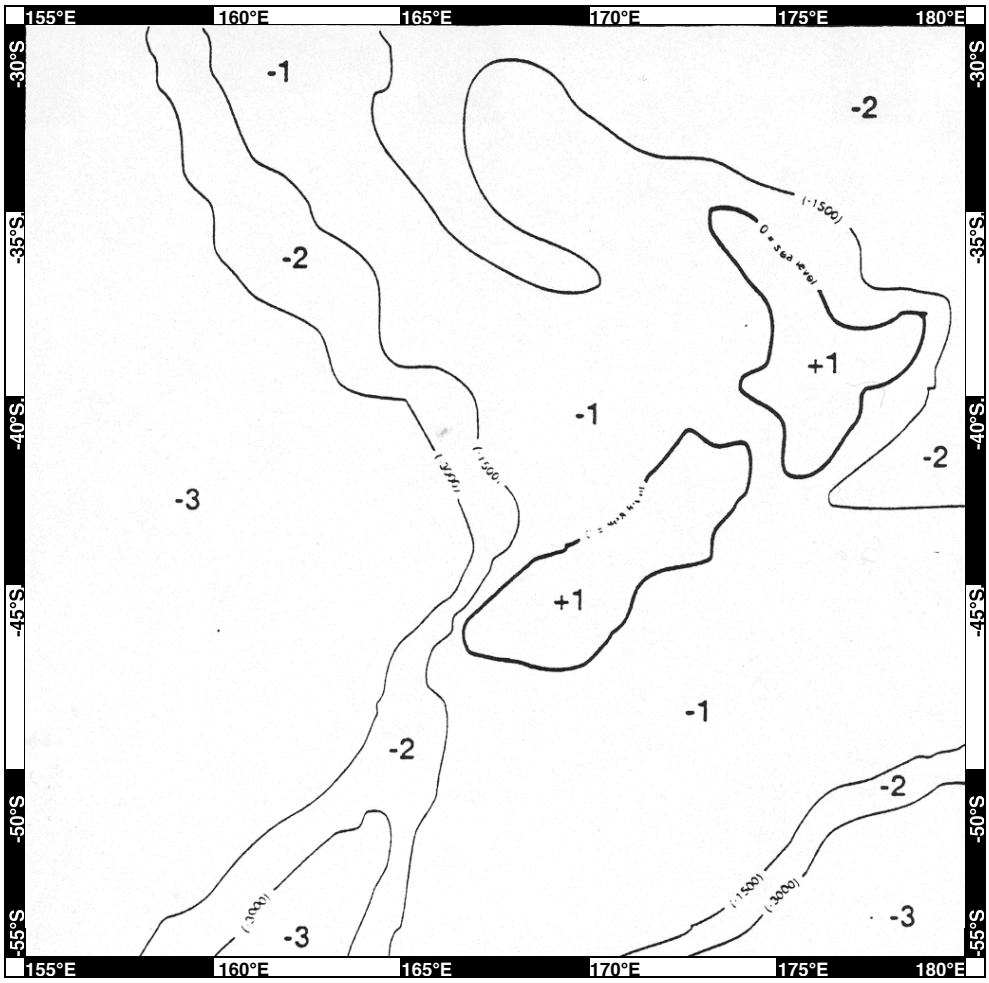
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

New Zealand Cutout Topographic Map



Elevation Key: Color in each number

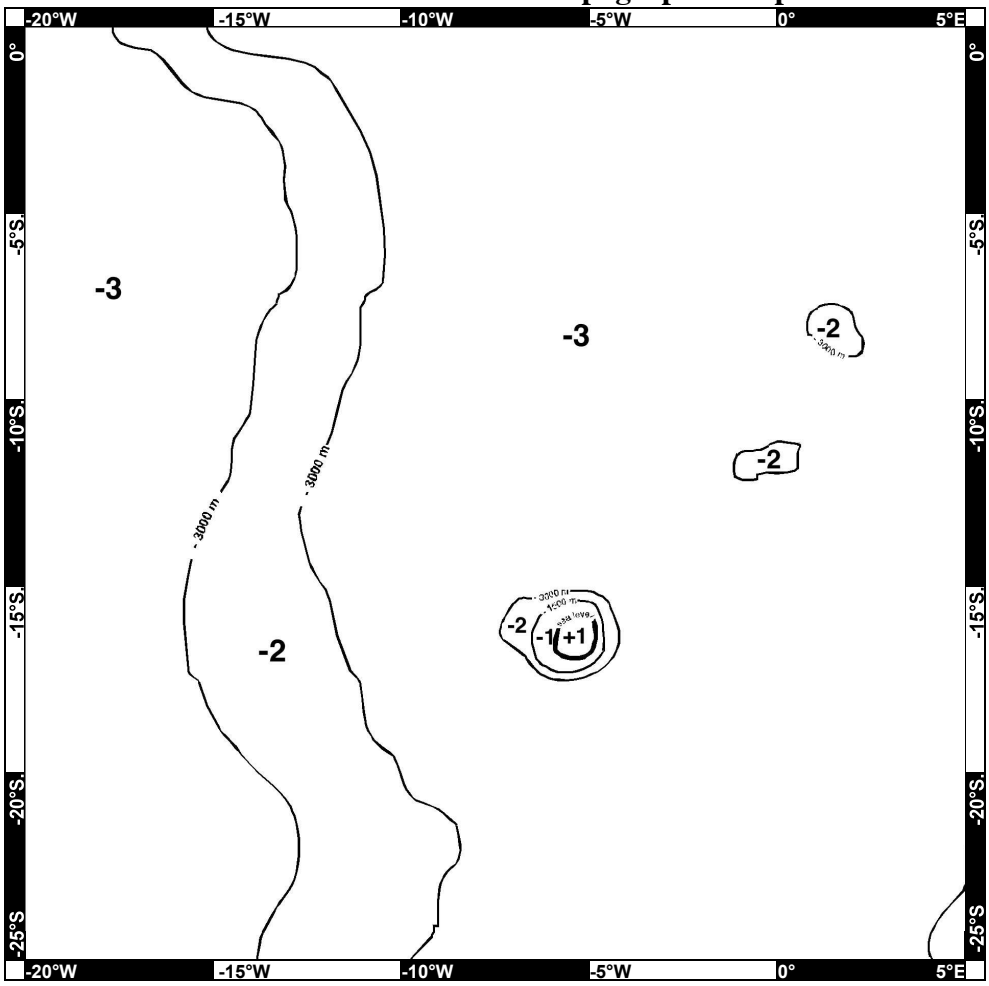
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

St. Helena Island Cutout Topographic Map



Elevation Key: Color in each number

+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
—	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

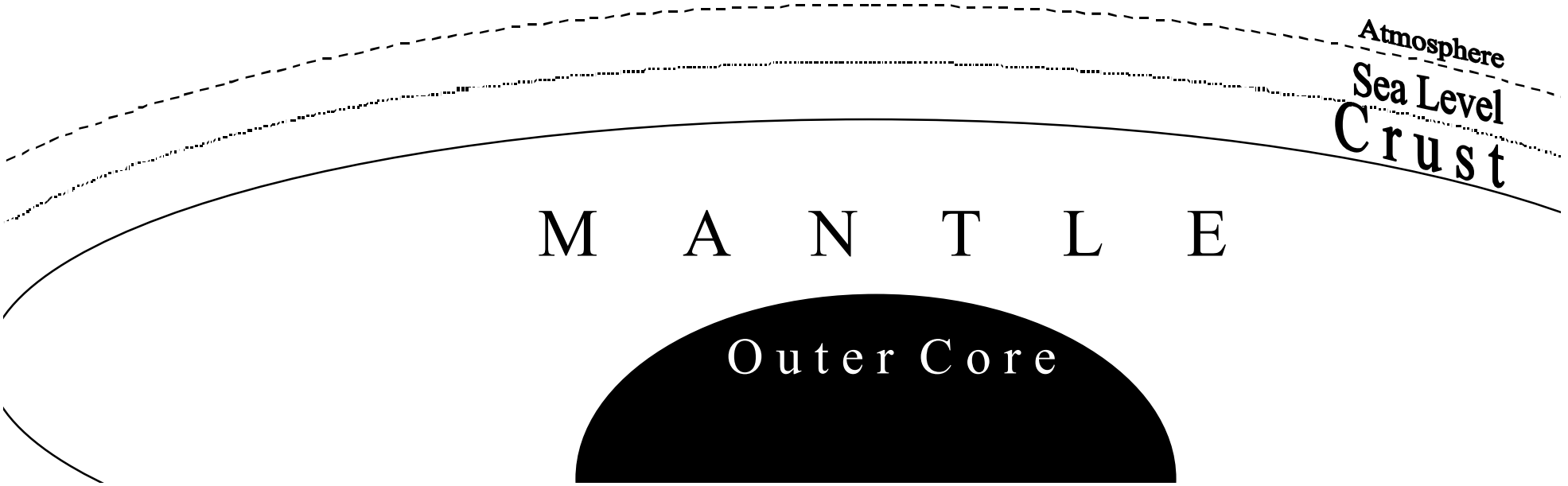
INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Name _____

The Cool Crust

Directions: Draw the things you think are part of the Earth's crust.



Name_____

Activity 3.1: The Cool Crust

Stop and Think Questions: The Egg: A Model of the Earth

A. According to the notes you read in your book:
   - How did Benny describe the crust of the Earth?

_____
_____
_____
_____
_____

   - How did he describe what is under the crust?

_____
_____
_____

B. According to Benny's letter, what does he think is moving? What is making it move? Do you agree with Benny? Why or why not?

_____
_____
_____

C. Most models have strengths (things they explain well) and weaknesses (things they don't explain well or problems where the model isn't quite right for what it's supposed to show). What do you think about the egg model of the Earth's layers? What are some strengths of the model? What are some of the weaknesses of this model?

_____
_____
_____

Name_____

Activity 3.1: The Cool Crust

Reflection Questions

A. How would you describe the Earth's crust to your pen pal?

_____

_____

_____

B. **It's Your Turn:** Write a letter back to Benny telling him what you think about his ideas about the moving plates. Your letter should also describe the strengths and weaknesses of his egg model. Draw your own model of the layers of the Earth. Be sure to include labels so that Benny will be able to understand your drawing clearly.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name_____

It's All Cracked Up

Figure It Out

8. What kind of indirect evidence do geologists use to study the structure of the Earth? Why can't they use direct evidence?

_____

_____

_____

_____

9. You learned some new facts about the layers of the Earth. Add these new ideas to the model you drew for Benny. Describe the strengths and weaknesses of the model you have now created.

_____

_____

_____

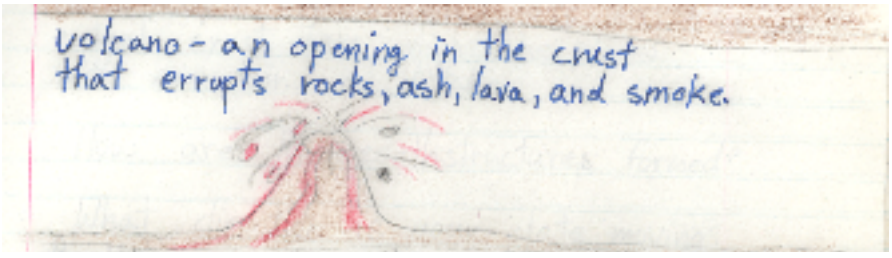
10. Why do you think we can't feel the Earth's plates moving over a long period of time? Is there ever a time when we can feel the Earth's plates moving for a short period of time?

_____

_____

_____

11. You have heard a lot of terms so far in this lesson. Create a picture dictionary for these terms: earthquake, volcano, plate, plate boundaries, crust, mantle, inner core, outer core, continental crust, seismic wave. (The class should add any other terms that have come up in class discussion and are important to figuring out what changes are happening in the crust and why.) Here is an example of one student's picture dictionary entry for volcano:



Name_____

It's All Cracked Up

Reflection Questions

A. What do you think is moving and changing during an earthquake or volcanic eruption?

_____

_____

_____

B. One of the other Junior Scientists described the Earth in terms of a peach. Draw a picture of what this model might look like. What are the strengths and weaknesses of this model?

_____

_____

_____

Name _____

Activity3.2: Moving Forward

Reflection Question

A. What kinds of patterns do you expect to see in these data?

_____

_____

_____

_____

Reflection Questions

Today you learned that there are many earthquakes occurring every day all over the world.

A. What one place that recently experienced an earthquake surprised you? Why was that surprising to you?

_____

_____

_____

_____

B. What questions did you ask yourself about earthquakes and where they happen as you looked at the USGS website?

Name _____

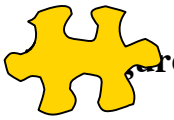
Activity 4.1: Real-Time Observations from Data

_____

_____

_____

_____



re It Out: *Ground Shaking*

1. Describe what happens during an earthquake.

_____

_____

_____

_____

2. Describing the tremors after the great San Francisco Earthquake of 1906, U.S. Weather Service forecaster Alexander McAdie wrote, "They will come at greater intervals and grow weaker until they become absolutely imperceptible." Write this sentence in your own words.

_____

_____

_____

3. Reread this part of the the first 9-1-1 recording from the Lom Prieta earthquake:

   Caller: It's tore up! Everything's tore up, should I take my kids outside?

   Dispatcher: Yeah, that would be a good idea because here comes another one!

   Do you think the dispatcher gave the caller good advice? Explain.

_____

_____

_____

4. How are earthquake data collected?

Name _____

Activity 4.1: Real-Time Observations from Data

_____

_____

_____

_____

5. What factors might affect how destructive an earthquake is?

_____

_____

_____

_____

6. Why is it easier to predict **where** an earthquake will occur than **when** it will occur?

_____

_____

_____

_____

Name _____

Activity 4.2: Plate Boundary Predictions

Reflection Questions

A. Were there any places you were pretty sure about? Why were you pretty confident that was a boundary? Are there any places you were unsure about?

_____

_____

_____

_____

B. What information is missing that might help you be more sure?

_____

_____

Name _____

Activity 4.3: Plotting Latitude and Longitude (OPTIONAL)

Using the blank map of the world your teacher gives you, complete the following activity.

Match the cities with the correct latitude and longitude.

___	1.	San Francisco, California	a.	-35^{O} S, -56^{O} W
___	2.	Perth, Australia	b.	7^{O} N, 80^{O} E
___	3.	Moscow, Russia	c.	56^{O} N, 38^{O} E
___	4.	Colombo, Sri Lanka	d.	32^{O} S, 116^{O} E
___	5.	Montevideo, Uruguay	e.	38^{O} N, -122^{O} W

Find and mark the following locations on the world map. Write the problem number on the coordinates on the map.

Problem	Latitude	Longitude	Location Name
6.	42^{O} N	13^{O}E	_____
7.	59^{O} N	18^{O} E	_____
8.	-22^{O} S	-48^{O} W	_____
9.	53^{O} N	-6^{O} W	_____
10.	40^{O} N	116^{O} E	_____
11.	-26^{O} S	28^{O} E	_____
12.	19^{O} N	-99^{O} W	_____
13.	41^{O} N	-87^{O} W	_____

Name _____

Activity 4.3: Plotting Latitude and Longitude (OPTIONAL)

Using your map, find the exact coordinates for these locations.

	City	Latitude	Longitude
14.	Anchorage, AK	_____	_____
15.	Aberdeen, Scotland	_____	_____
16.	Denver, CO	_____	_____
17.	Honolulu, HI	_____	_____
18.	Athens, Greece	_____	_____
19.	Bangkok, Thailand	_____	_____
20.	Belfast, Northern Ireland	_____	_____
21.	Warsaw, Poland	_____	_____
22.	Bombay, India	_____	_____
23.	Hong Kong, China	_____	_____
24.	Lisbon, Portugal	_____	_____
25.	Munich, Germany	_____	_____

Name_____

Activity 4.4: Plotting and Analyzing Earthquake Data

Reflection Questions

A. Describe the patterns you saw.

_____

_____

_____

_____

B. Is one week of data enough to predict your plate boundaries? Explain.

_____

_____

_____

_____

C. Describe the patterns you would expect to see in one year of earthquake data.

_____

_____

_____

_____

D. Do you think one year of data is enough data to predict your plate boundaries? Explain.

_____

_____

_____

_____

Activity 4.4: Plotting and Analyzing Earthquake Data

E. The San Francisco earthquake of 1906 sparked much study of the Earth and the changes that happen in the Earth's crust. Telephones did not exist, computers were not yet invented, and communication on a global scale was left to the mail. After experiencing plotting earthquake data the "old fashioned" way, what do you think are the challenges of trying to understand the changes in the crust? What advantages does technology bring?

_____

_____

_____

_____

F. Add any new words from this lesson to your picture dictionary and improve the definitions for those you have already done.

Activity 4.5: "Restless Earth" Video

Stop and Think Questions:

A. Describe some of the ways seismologists measure and predict earthquakes. What are some of the tools that they use and what do these measure?

_____

_____

_____

_____

B. Why is it important to study earthquakes that happened over 300 years ago?

_____

_____

_____

_____

C. Eighty percent of all Earth's earthquakes have happened along an area around the Pacific Rim. What is this area called? What type of earth structure do you think is found along this area?

_____

_____

_____

_____

Name_____

Activity 5.2: Looking for Patterns in One Year of Data

Stop and Think Questions

A. Look at the one week of data your class plotted on a map and the one year of data plotted on this new data map. What do you notice about patterns in the data? Do you see the same patterns? Do you see different patterns? Describe what you see.

_____
_____
_____
_____
_____

B. Compare your plate boundary prediction from Activity 5.1 to this new data map. Where would your prediction lines be on the data map? How well does your prediction line up with the earthquake data?

_____
_____
_____
_____
_____

Name_____

Activity 5.2: Looking for Patterns in One Year of Data

Reflection Questions

A. How have your predictions changed today? Why did they change?

_____

_____

_____

B. How did you predict your plate boundaries? How did your group work on this problem together?

_____

_____

_____

_____

C. Did you have "enough" data to support your plate boundary prediction? How did you decide?

_____

_____

_____

_____

_____

Name_____

Activity 5.3: *MyWorld* Data

Reflection Questions

You have made a series of predictions so far. You made predictions in Activity 4.2, and again Activity 5.1 and 5.2.

A. How have your predictions changed?

_____

_____

_____

B. Why have your predictions changed?

_____

_____

_____

C. How certain do you feel now of your plate boundary lines?

_____

_____

_____

_____

_____

Name _____

Activity 5.4: Neighbor Plate Meeting

Reflection Questions

A. What region did you disagree on most? How did you work it out?

_____

_____

_____

_____

B. Did any of your plate boundary prediction lines change during the meeting today? If so, why did you change them?

_____

_____

_____

_____

Name _____

Activity 5.5: Neighbor Plate Meeting Reports

Reflection Questions

A. What is a plate? Write a description of the plate that you mapped.

_____

_____

_____

B. Your class has been collecting questions about the Earth's crust, earthquakes, and volcanoes. Which of these questions have you answered? Do you have any new questions?

_____

_____

_____

_____

_____

C. In Lesson 1, you wrote explanations for how and why earthquakes and volcanoes were happening at your earth structure. Earthquakes and volcanoes are evidence that the crust is moving and changing. Explain how and why you think these changes are happening at your earth structure.

_____

_____

_____

_____

Name _____

Activity 5.5: Neighbor Plate Meeting Reports

D. In Lesson 4, you read about three historically significant earthquakes: one in New Madrid, Missouri in 1812, the Great San Francisco Earthquake of 1906, and a deep earthquake near the Fiji Islands in 2002. Based on your class map of the plate boundaries, on what plates did these earthquakes take place? Did all of these earthquakes happen on a plate boundary? Why do you think they did or did not?

_____

_____

_____

_____

_____

E. **It's Your Turn:** Write a letter to the lead researchers at the NESS describing the plate boundaries you found for your earth structure and include the supporting evidence you used to support your final prediction. NESS researchers would like to know where you feel sure about the data and where you are still unsure. And, if there are places that you still have questions about or where there was much debate during the conferences, tell NESS about these locations as well.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name _____

Activity 5.5: Neighbor Plate Meeting Reports

_____

_____

Name _____

Activity 5.6: A Closer Look at Earthquakes

Reflection Questions

A. Why do you think some earthquake patterns are similar?

_____

_____

_____

B. Why do you think some earthquake patterns are different?

_____

_____

_____

C. **It's Your Turn:** Look back at the letter your pen pal sent you. Compare the earthquake data you plotted with the description of earthquakes in the letter. Write a letter to your pen pal describing your comparison.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name _____

Activity 6.1: Heating Soup

Stop and Think

A. Using the *Magma Convection* worksheet, draw arrows to represent the convection currents in the Earth's mantle.

B. Make a prediction. What do you think happens to the magma if there is a crack in the crust?

_____

_____

_____

Figure It Out:

1. Why do the plates of the crust move?

_____

_____

_____

2. How does the crust move? Draw arrows on the crust of your *Magma Convection* worksheet showing what happens to the crust.

3. Think back to the example of the pot of soup. If you take the soup off the heat, the bubbling stops after a few seconds. Imagine we could shut off the heat in the inner core of the Earth. What do you think would happen to the Earth?

_____

_____

_____

4. Suna described how magma escapes through cracks in the crust, and crust is added as a result. Do you think crust is always added the same way? Why do you think this?

_____

_____

_____

Name _____

Activity 6.1: Heating Soup

5. Do you think all volcanoes erupt the same way? What makes you think that?

_____
_____
_____

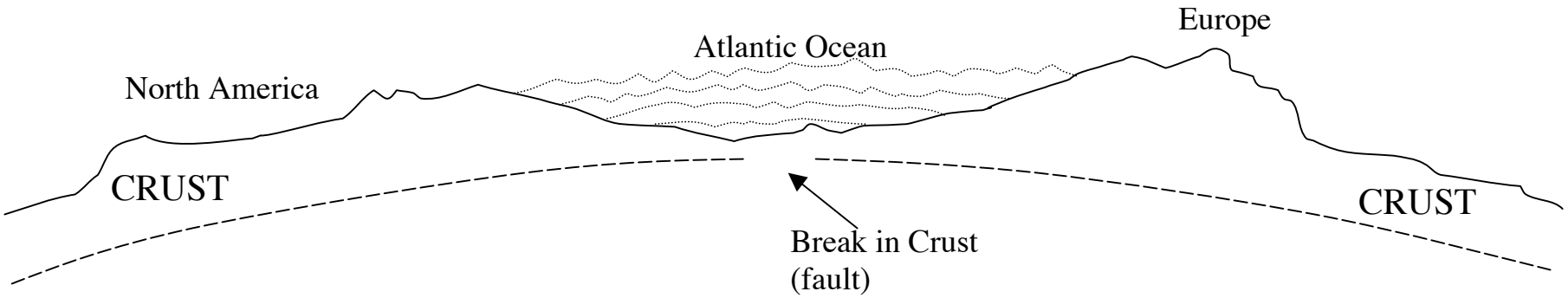
6. Look back at the explanations in the *Think About This* box at the beginning of the lesson. Knowing what you do now about how and why the crust moves, what would you say to Cate from New Zealand? To Keona from Hawaii? To Kazuo from Japan? To Consuela from Mexico?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

7. You have learned some new terms in reading the explanations. Add these new terms to your picture dictionary.

Name _____

Magma Convection



Name _____

Activity 6.2: Comparing Volcanic Activity

Reflection Question

Why are there differences in volcanic activity?

_____
_____
_____
_____
_____

Name _____

Activity 6.3: Oozing and Blasting Volcanoes

Reflection Questions

What questions did you ask yourself about volcanoes as you looked at the real-time website?

_____

_____

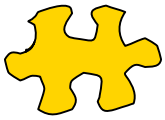


Figure it Out

1. What is a volcano?

_____

_____

2. How long does an eruption last?

_____

_____

3. Compare a shield volcano, a stratovolcano, and a cinder cone volcano. A table might help you organize your ideas.

Name _____

Activity 6.3: Oozing and Blasting Volcanoes

4. Where do most volcanic eruptions occur?

_____

5. What types of volcanoes are at your earth structure? Explain.

_____

_____

6. You have learned some new terms in this reading. Add these new terms to your picture dictionary.

Name_____

Activity 6.4: Characterizing Volcano Data Patterns

Reflection Questions

A. Why do you think volcanoes happen in different patterns at different earth structures?

_____

_____

B. Why do you think earthquakes happen in different patterns at different earth structures?

_____

_____

C. **<u>It's Your Turn:</u>** Write a letter to your pen pal describing the pattern of volcanoes and the type of volcanoes you think are at your earth structure. Be sure to tell your pen pal how you figured these things out.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name_____

Activity 6.4: Characterizing Volcano Data Patterns

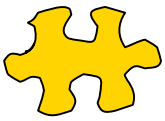


Figure It Out

A. Were the volcanoes described in the video "quiet" or "explosive" volcanoes?

_____

_____

B. What kinds of data are collected to help predict if a volcano is going to explode?

_____

_____

C. The video described Hawaii as a hot spot. What is a hot spot? How is crust added at Hawaii?

_____

_____

D. Why do new active volcanoes continue to pop up and old volcanoes go extinct at a hot spot?

_____

_____

E. Is your earth structure changing because of the same process that is happening in Hawaii? Explain.

_____

_____

_____

_____

Name_____

Activity 7.1: Characterizing Both Data Patterns

Reflection Questions

A. Name one earth structure you think has the same kinds of earthquake and volcano patterns as your earth structure. Why do you think they are similar? What is causing the changes happening at your earth structure?

_____

_____

_____

_____

B. You know that each time a volcano erupts; new crust is added to the surface. In the letters you read in Activity 6.1, you learned that the crust is added when magma rises and oozes through the cracks in the crust, forming narrow ridges of volcanic mountains and pushing the plates apart. Based on the data you have analyzed do you think crust is added at your earth structure in that same way? Why do you think that? What might make it different? Is crust added at your earth structure? If so, how?

_____

_____

_____

_____

_____

_____

_____

_____

Name_____

Activity 7.1: Characterizing Both Data Patterns

Figure It Out*: Zones*

1. Which zones are places where crust is being added?

_____
_____

2. Which zones are destroying crust?

_____
_____
_____

3. Why does one plate subside under another plate?

_____
_____
_____

4. Most earthquakes happen near the surface, within the thin crust. At which zone do earthquakes happen deep in the upper mantle? Why?

_____
_____
_____

5. What type of volcano eruption pattern do you expect to see at a subduction zone? What types of volcanoes are generally created at a subduction zone?

_____
_____
_____

6. What type volcano eruption pattern do you expect to see at a rift zone? What types of volcanoes are generally created at a rift zone?

_____
_____
_____

Name_____

Activity 7.1: Characterizing Both Data Patterns

7. You have learned some more terms in this lesson. Add these new terms to your picture dictionary. Improve the definitions and pictures you have already done.

8. **<u>It's Your Turn</u>:** Draw a picture of what you think is happening at your earth structure. Describe the evidence that you have to support this.

Name_____

Activity 7.2: Identifying Zones

Reflection Questions

A. How did you determine what direction your plate was moving?

_____

_____

_____

B. Why do some plates subside and other buckle up when the plates collide?

_____

_____

_____

C. In the Figure It Out questions after the *Zones* reading, you drew a picture that explains the process changing your earth structure. After today's discussion and a closer look at the data, make any changes or additions to your picture to better represent this process.

D. Describe the evidence you have to support your explanation. Earthquakes? Volcanoes? Topographical data? Anecdotes from your pen pal?

_____

_____

_____

_____

_____

_____

Name_____

Activity 7.3: Depth of Earthquakes

Figure It Out:

1. Compare oceanic crust to continental crust.

_____

_____

2. Is the plate your earth structure is part of primarily oceanic crust or continental crust?

_____

_____

3. Why might you expect to see deep earthquakes at a subduction zone?

_____

_____

_____

4. **<u>It's Your Turn:</u>** Go back to the picture you drew in Activity 7.1 and improved in 7.2. How did you represent oceanic and continental crust in your diagram? Label oceanic and continental crust on your drawing.

_____

_____

Figure It Out

1. Where do the deep earthquakes happen? Where do they happen in relationship to the plate boundary? How can you explain this pattern?

_____

_____

_____

_____

Name_____

Activity 7.3: Depth of Earthquakes

2. The earthquake and volcano data indicate that the Aleutian Islands and Japan are subduction zones. Compare them. How are they similar? How are they different? How do you explain the differences?

_____

_____

_____

_____

3. Name another place where there is a subduction zone. Explain how the data supports that location.

_____

_____

_____

Reflection Question

What types of movement zones are happening at your earth structure? Describe the data you have to support that idea.

_____

_____

_____

_____

Name_____

Activity 7.4: Volcano Types Data

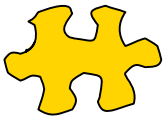


Figure It Out

1. Where do the stratovolcanoes occur? Where do shield volcanoes occur? Where do cinder cones occur?

_____

_____

_____

_____

2. Look at the Ring of Fire. We know that at the north and west edges of this plate there are many subduction zones. Where do the stratovolcanoes happen in relation to these subduction zones? Where do shield volcanoes happen?

_____

_____

_____

_____

Reflection Question

What types of movement zones are happening at your earth structure? Describe the data you have to support that idea.

_____

_____

_____

_____

Reflection Questions

A. Did any group agree with your explanation or analysis of the data? Explain.

Name_____

Activity 7.5: What is Happening at Your Earth Structure?

B. Did any group contradict your explanation or analysis of the data? Explain.

C. What questions that came up in your group do you think are worth pursuing and why?

D. **It's Your Turn:** Write a brief letter to your pen pal describing your experience with this project.