

# WHAT ARE BIOMES?

## Unit 3: Biological Features

### Lesson 9 — Grade 6

#### INSTRUCTIONS



### Overview

In this lesson, students will graph the elevation of tree line at different latitudes from north to south.

### Objectives

On successful completion of this lesson, students will be able to:

- make a graph showing the elevation of tree line at different latitudes;
- analyze the graph to determine the effect of altitude on tree line and biomes; and
- estimate the tree line at northern latitudes.

### Alaska Standards

#### Alaska Science Standards / Grade Level Expectations

- [6] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.
- [6] SA3.1 The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by gathering data to build a knowledge base that contributes to the development of questions about the local environment (e.g., moose browsing, trail usage, river erosion).
- [6] SC1.2 The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by recognizing that species survive by adapting to changes in their environment.

### Alaska Cultural Standards

- [E] Culturally knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them. Students who meet this cultural standard are able to:
- [E.2] understand the ecology and geography of the bioregion they inhabit.

### Bering Strait School District Scope & Sequence

M.S. Sequence 6.9: Ecosystems

G. Understand how ecosystems change over time.

M.S. Sequence 7.1 Earth's Structure

D. Know how to use longitude and latitude, prime meridian and equator using grid lines.



# WHAT ARE BIOMES?



## Materials

- Student Worksheet: Tree Line and Latitude
- Overhead: World Map
- Overhead: Plotting Data

## Multimedia

REACH Multimedia 4-6: "What are Biomes?"

REACH Multimedia 4-6: "What are Alaska's Biomes?"

Available at: [www.k12reach.org](http://www.k12reach.org)

## Additional Resources

Glencoe Life Science Ch 22

Glencoe Earth Science Ch 1

## Whole Picture

Broadly, a biome is a particular geographic area designated by the plants and animals that live there. Depending on which scientist a person asks, the definition of what constitutes a biome varies. Some use a general definition, marking only six major types: forest, freshwater, marine, desert, grassland, and tundra (National Geographic Education). Others define biomes more precisely marking dozens of possibilities; for example, rather than grouping all forests together, they might classify different types of forests (taiga, tropical, deciduous, etc.).

Importantly, scientists distinguish between biomes and ecosystems. Whereas a biome is a particular geographic area, an ecosystem is a particular habitat classified by the interactions between living and non-living things. Accordingly, a single biome might include several different ecosystems (National Geographic Education).

Biomes are not static, and as the climate changes, so too do the plants and animals in particular areas. For example, 10,000 years ago, at the end of the last ice age, Beringia, including the Bering Land Bridge, was neither covered by ice nor covered by water. Scientists believe that the area was covered by grasses and low-lying shrubs, and was inhabited by animals like saber toothed cats, woolly mammoths and other large, now extinct animals. Today, the same area is a marine biome — it is covered by water and inhabited by marine species. The plants and animals that once thrived there are now either extinct or have made new homes in the Alaska and Chuckchi regions.

As climate change brings rapid changes to the Arctic and subarctic, Alaska Native people who live largely by subsisting off the bounty of their local biome, are beginning to notice dramatic changes to animal and plant species. In effect, the rapid changes are allowing people to witness biome change first-hand.



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Across the region, elders, respected hunters, and community members have noticed a decline in certain animal and plant species. Kenneth Kingeekuk, the former Vice President of the Savoonga Tribal Council, explained that many lakes, ponds, and swaths of coastline have been lost due to a warming climate. These changes have affected the plants and animals that once defined the biome. In areas where migratory birds were once abundant, and people could count on harvesting their eggs, people have witnessed a dramatic decline in certain species, like snow geese and king eiders, and many are concerned that the birds will eventually cease to come at all (Fienup-Riordan and Rearden, 2012; Kingeekuk, 2010).

It isn't merely the land biomes that are changing; especially in regions where people subsist off the marine biome, marked changes have been noted. Edward Hooper, from Nelson Island indicated, "I used to go by kayak to fish for manignaleryiit [Pacific Cod], and after loading my kayak, I'd return home. We can no longer do that. No codfish, nothing. And although Capelin are around, they aren't as abundant. And herring also — for two years now, the shore hasn't turned white [from herring eggs on kelp]" (Fienup-Riordan and Rearden, 2012, p.308).

While it's true that biomes have always changed, what scientists and locals alike are concerned about is the rapid rate at which they now appear to be changing. On account of these changes, George Noongwook, a respected hunter in Savoonga says, "we have to learn new ways of doing things in terms of getting food" (Noongwook, 2010).

## Vocabulary

**tree line** the zone at high altitudes, or latitudes, marking the boundary between forests and treeless regions

**latitude** distance north or south from the equator measured in degrees

## Activity Procedure

1. Ask students to look at a world map of biomes in their textbook. (Or, use the multimedia map available at [www.k12reach.org](http://www.k12reach.org).) Ask them for observations about the biomes going north and south from the equator. Ask if there is any tundra near the equator. Ask if they think it would be possible to find tundra near the equator. If so, where would it be?
2. Explain that tree line is the boundary between forests and treeless areas, such as lowland and alpine tundra biomes. In this activity students will compare latitude with the elevation that tree line occurs. The exact elevation of tree line is an approximation. Factors such as slope, aspect, being in a rain shadow, etc. can influence the tree line in a specific area.
3. If necessary, review latitude using the Overhead: World Map.
4. If necessary, review how to make a line graph the Overhead: Plotting Data.
5. Handout the worksheet and have students write a prediction before completing the activity. Point out the locations from the data table on the world map, showing that they are all at different latitudes.

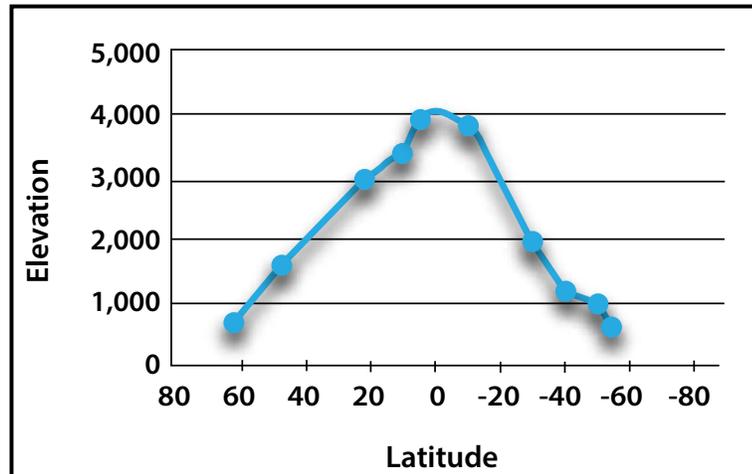


# WHAT ARE BIOMES?



## Answers

Comparing Treeline Elevation and Latitude



1. Treeline decreases in elevation.
2. Above 4000 meters
3. Approximately 600 meters
4. Approximately 75 degrees
5. **Elevations** - Tree line elevation would increase to a higher elevation.  
**Latitude** -Tree line would be found at a higher latitude north and south.
6. Answers will vary.

## References

- Fienup-Riordan, Ann, and Alice Rearden. (2012). Ellavut: Our Yup'ik World and Weather. Continuity and change on the Bering Sea Coast. Seattle and London: University of Washington Press.
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- Smith, Ronald L (2008). Interior and Northern Alaska: a Natural History. Book Publishers Network



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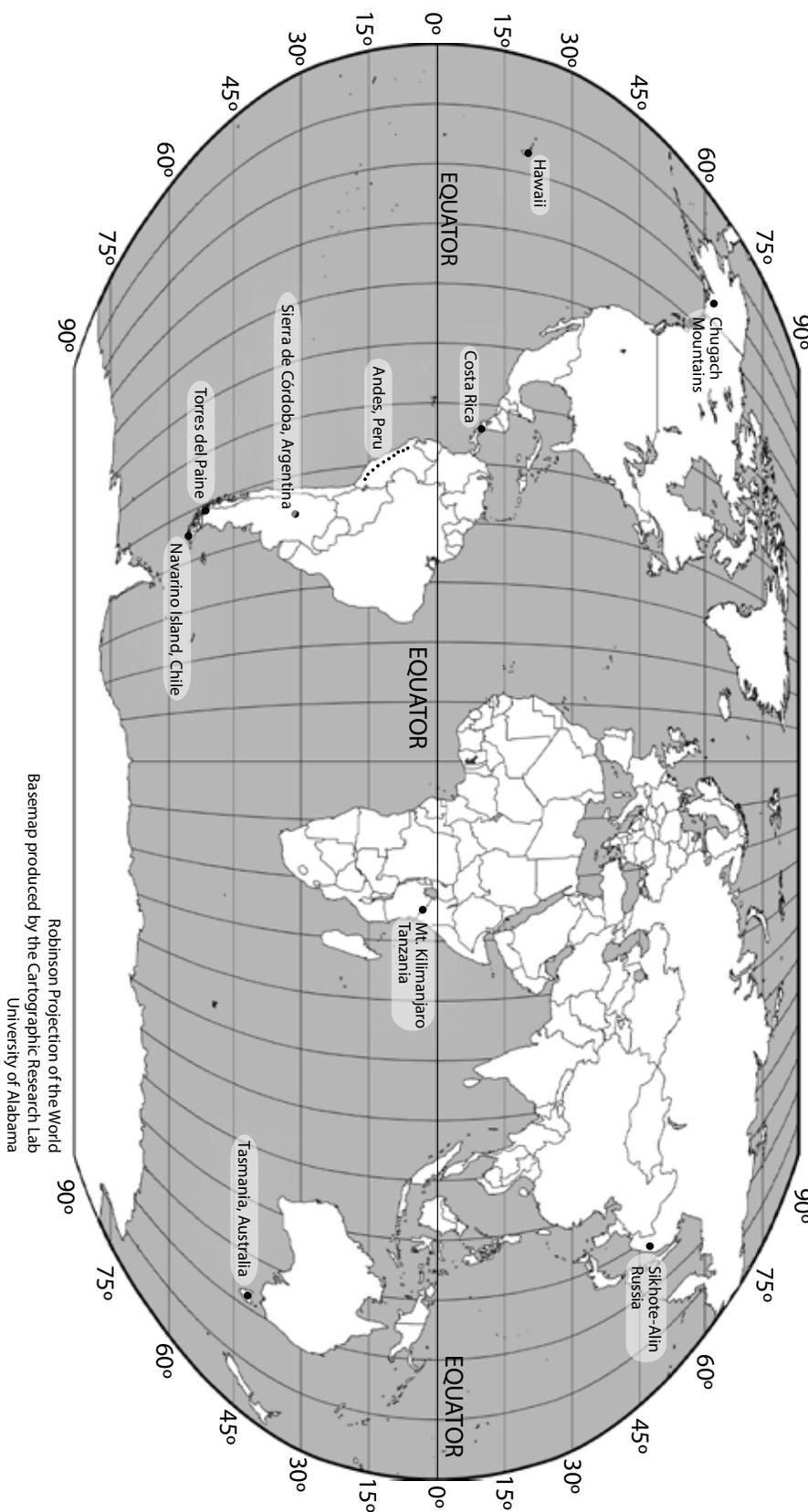
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#### APPENDIX



### Overhead: World Map



Robinson Projection of the World  
Basemap produced by the Cartographic Research Lab  
University of Alabama



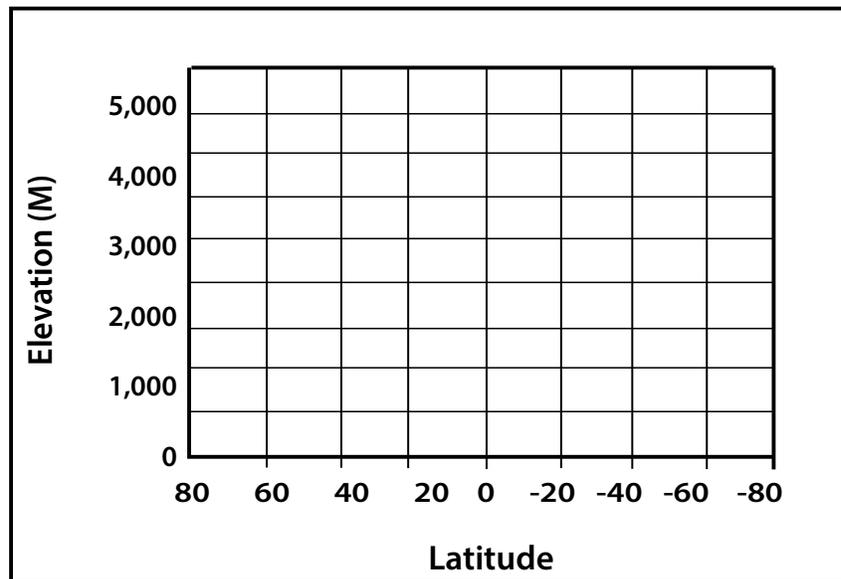
# WHAT ARE BIOMES?



## Overhead: Graphing Data

Place	Latitude	Treeline Elevation (M)
Scotland	57	500
Olympic Mountains WA, USA	47	1,500
New Guinea	6	3,850
Tasmania, Australia	-41	1,200
Navarino Island, Chile	-55	600

Comparing Treeline Elevation and Latitude



# WHAT ARE BIOMES?



## Student Worksheet: Treeline and Latitude

Name \_\_\_\_\_

### Introduction

The predominate biome along the equator is a tropical rainforest. Moving north or south from there will be deserts, grasslands, forest and tundra biomes. Besides latitude, the elevation of a region will also determine the types of plants and animals found there.

Tree line is the edge of where trees are able to grow. Above tree line the conditions are too harsh for trees to grow. Although there are many factors that will determine where tree line occurs, by examining the elevation of tree line at different latitudes a pattern can be seen.

Over time the location of tree line has changed as the climate has changed. During periods of high glaciation the northernmost tree line was in the Lower 48 while during interglacial period tree line extended as far north as the Seward Peninsula and North Slope of Alaska. As the climate has changed over thousands of years the boreal forests have gone through several extinctions and reestablishments.

### Prediction

What happens to the elevation of tree line as the distance from the equator increases?

### Directions

Plot the latitude and tree line elevation data from the table below on the graph to show the relationship between latitude and tree line.

#### Data

Place	Latitude	Treeline Elevation (M)
Chugach Mountains, Alaska	61	700
Sikhote-Alin, Russia	46	1,600
Hawaii	20	3,000
Costa Rica	9.5	3,400
Mount Kilimanjaro, Tanzania	3	3,950
Andes, Peru	- 11	3,900
Sierra de Córdoba, Argentina	- 31	2,000
Tasmania, Australia	- 41	1,200
Torres del Paine, Chile	- 51	950
Navarino Island, Chile	- 55	600



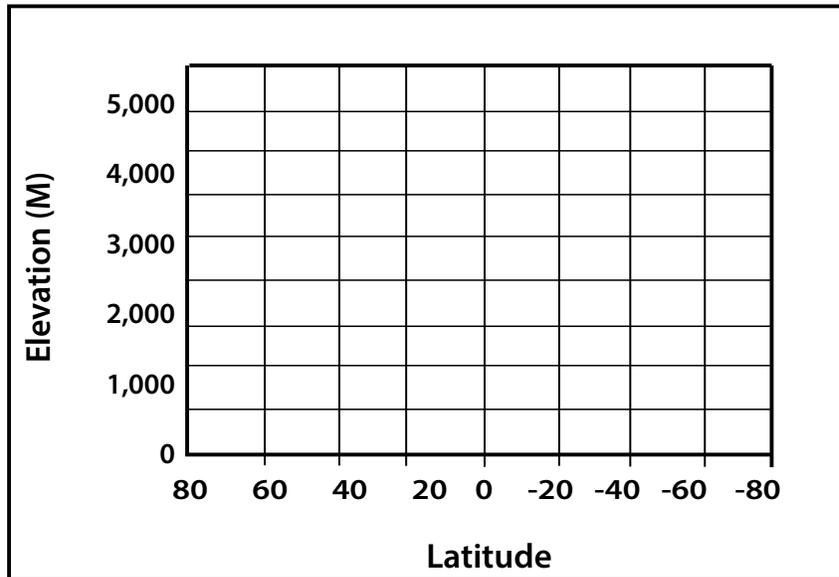
# WHAT ARE BIOMES?



## Student Worksheet: Tree Line and Latitude

Name \_\_\_\_\_

### Comparing Treeline Elevation and Latitude



### Questions

1. As the latitude increases, what happens to the tree line?
2. At what elevation would you be able to find alpine tundra on the equator?
3. The latitude in Nome, Alaska is 64.5 degrees. Based on your graph, what would you expect its tree line elevation would be?
4. What is the approximate latitude where tree line is at 0 meters elevation in the northern hemisphere?



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## Student Worksheet: Tree Line and Latitude

Name \_\_\_\_\_

5. If climate change increases the temperature, what might happen to the elevation of the tree line? How would the latitude change where the treeline is found if temperature increases?

Elevation -

Latitude -

6. If climate change increases the temperature how might the landscape around your community change?

