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# **Earth and Space: Topographic Maps — Satellite Images**



# ***Earth and Space***

## **Topographic Maps—Satellite Images**

### **Teacher Pages**

#### **Purpose**

The purpose of this station is to reinforce students' understanding of the interpretation of topographic maps and satellite images that can be used to identify land and erosional features and to predict how these features may be reshaped by Earth's process of weathering.

#### **Essential Understandings**

- Topographic maps are useful for identifying Earth's land features, such as mountains, valleys, river basins, etc.
- Topographic maps contain contour lines that depict the elevation at a particular point on the map. Every point on a contour line represents the same elevation.
- Contour intervals on a topographic map can be used to determine how steep a land feature is by observing how close the lines are to each other. The closer the lines, the steeper the land feature. Contour lines crossing a river form a "V" shape that points in an uphill direction.
- Satellite images are used by scientists to identify land features and can be used to observe changes in land features over time by comparing images taken at different times.
- Observing satellite images taken over a period of time can aid scientists in identifying erosional features around the Earth.

#### **Materials**

Cardstock (3 pieces)  
Cardboard (about 9.5 inches by 11 inches)  
Glue

*The following materials are included in the blackline masters for this station.*

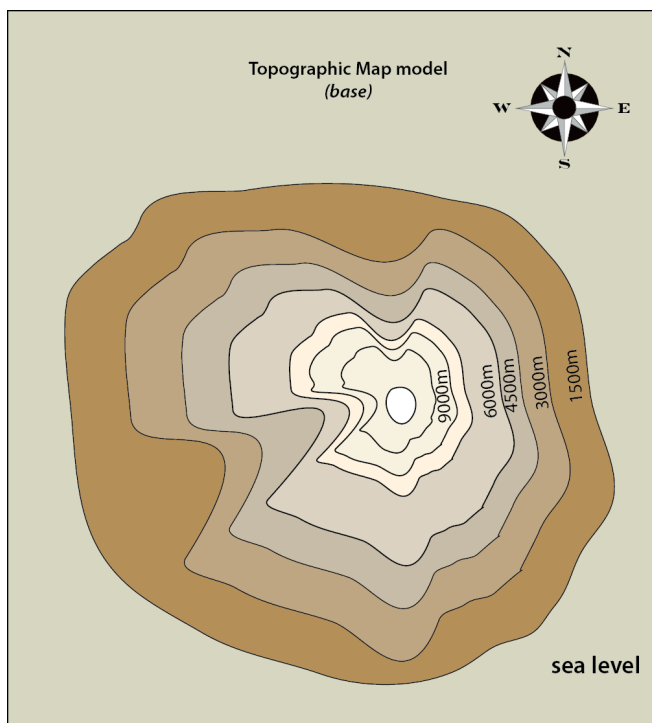
Station Information Sheet (1 per station)  
Topographic Map Model base and pieces (1 set per station)  
Meandering Stream satellite view (1 per station)

#### **Advance Preparation**

1. Print one copy of all the blackline masters for this station using a color printer. Color is essential to the station activities. Make one copy of the Student Pages (including the glossary) for each student.

**Note:** Print the three Topographic Model pages on cardstock.

2. Laminate the Station Information Sheet and Meandering Stream satellite view.
3. Cut out the Topographic Model base and glue it to the cardboard
4. Cut out each piece of the Topographic Model and glue them to the Topographic Map base, starting with the lowest elevation and working up to the highest elevation. When viewed from above, it should look similar to the example below.



## Station Setup

1. Tape the station information sheet to the station table. Students will use this to confirm the station is set up correctly.
2. Set out the Topographic Map model.
3. Place the laminated copy of the Meandering Stream satellite view at the station.

## Procedures

1. Tell students to check the station setup against the Station Information Sheet when they arrive at the table. If anything is missing or out of place, they should notify you.
2. Distribute a copy of the Student Pages to each student. Instruct students to work through the procedures and answer the questions with their teammate(s).
3. As students work through the station activity, circulate around the room, checking their work and responding to questions.

## Guide to Student Responses

**Note**—The suggested student responses presented below in italics represent the best possible answers to the student questions; actual student responses may vary.

### Essential Question

What can scientists learn by studying topographic maps and satellite images of a particular area of the Earth?

*Topographic maps can be used to identify land and erosional features on the surface of Earth. The maps can also be used to make predictions about the impact of weathering and erosion.*

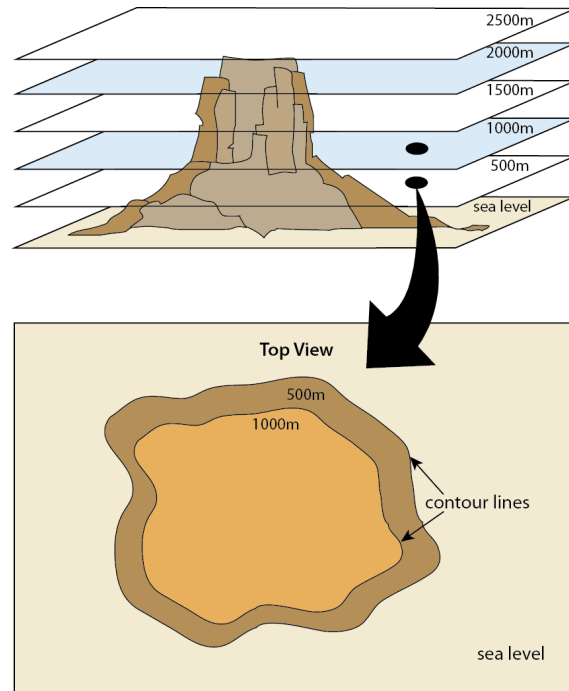
### Part I: Topographic Maps

#### Procedures

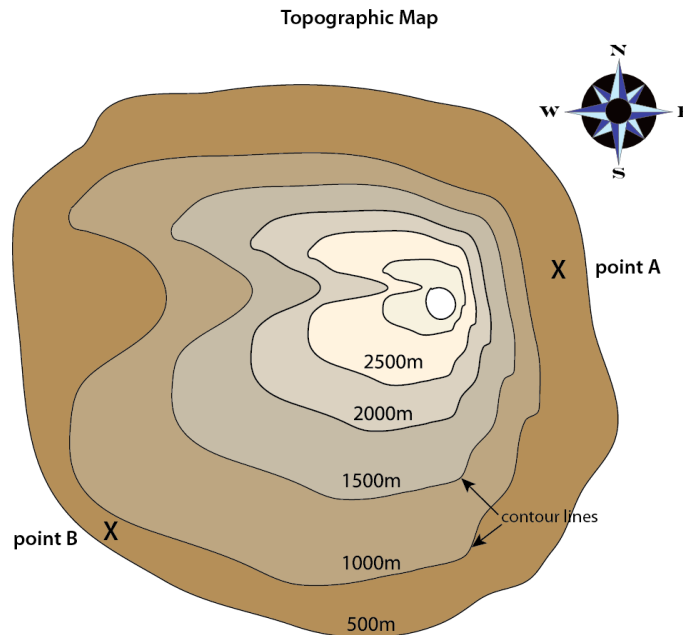
Topographic maps are useful in understanding landforms and how landform shapes and elevations differ, sometimes changing from one part of an area to another.

The graphic below shows what the contour lines represent on a topographic map. If scientists could take a slice through the mountain 500 meters above sea level and another at 1000 meters and make a drawing of the shapes from above, it might look like the circles at the bottom. Each circle is known as a contour line and represents a specific elevation. As these slices stack up, a topographic map of the mountain is made.

Contour lines on a map show all points on an irregular circle that are of the same elevation. Contour intervals on a topographic map can be used to determine how steep a land feature is by observing how close the lines are to each other. The closer the contour lines are to each other, the steeper the slope of the land feature.



A simple topographic map with several contour lines is shown below. Examine the map with your partner and answer the questions below.

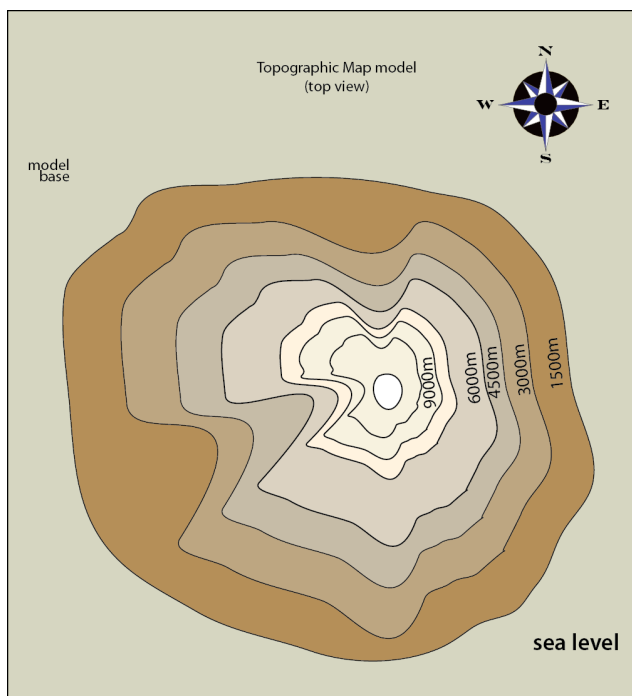


1. If you and your partner were on a hike and arrived at this mountain, which would be the easier climb: beginning at point A on the east side and climbing to the top or starting at point B and climbing northeast to the top? Use data from the map to explain your reasoning.  
*Point B would be the easier climb, since the mountain is less steep on that side. The contour lines are farther apart, indicating a gradual slope to the mountain. The contour lines from point A to the top are closer, indicating a much steeper slope.*

2. What is the highest point above sea level on the mountain? What data from the map supports your answer?

*The highest point on the mountain is approximately 3,500 meters. The distance between the contour lines is 500 meters, and there are two more contour lines after the 2,500-meter mark.*

3. Locate the **Topographic Map model** at your station.



4. Examine the information on the model with your partner. Describe the landform features you can identify by looking at the model. Explain your reasoning.

*Answers may vary. The mountain contains two gullies caused by weathering and erosion, one facing north and the other facing west–southwest. The valley facing north has steeper walls than does the other valley.*

5. What is the contour interval on this map? Explain your reasoning.

*The contour interval is 1,500 meters distance between lines.*

6. When you reach the top of the mountain, how high above sea level will you be standing?

*The topographic model shows a mountain that is approximately 12,000 meters high.*

7. Which portions of the model represent areas that could have been formed as a result of weathering and erosion? Use data from the map to support your claim.

*The different elevations of the mountain and the cuts found on the north and west sides of the mountain are a result of weathering and erosion. Since all of the layers of the mountain were originally flat, the exposure of the layers are a result of rock and soil material being weathered and carried away by wind or water. The areas that are cut out on the north and*

*west sides of the mountain are where additional work and soil was weathered and carried away as result of erosion.*

8. If the natural events that resulted in the surface features of this model continue, what predictions can be made about changes that will occur in the near future? In the distant future?

*In the near future, the cuts into the north and west sides of the mountain will become deeper and wider. In the distant future, the entire mountain may be worn away.*

9. What evidence supports your reasoning?

*Weathering and erosion have worn away portions of the mountain. If the processes that caused this continue, the remainder of the mountain will also wear away. In the short term, only the portions of the mountain in areas that have already started this process will wear away. In the long term, the remainder of the mountain could wear away.*

10. Locate the **satellite view of the Meandering Stream** at your station. Satellite images are images of Earth or other objects that have been captured by artificial satellites. How is a satellite image of Earth's surface features similar to and different from a contour map?

*Contour maps provide details about elevation that satellite images do not provide. Both satellite views and contour maps provide information about the surface features that exist in an area.*

11. How can satellite imagery be used to support claims about the impact of weathering and erosion over an extended period of time or erosion that may have occurred as a result of natural hazards, like flooding?

*If multiple satellite images were taken over a period of time, they can be used to determine how weathering and erosion have changed the surface features. After a flood or hurricane, satellite images can be used to show how natural events changed the surface features of an area.*

12. Now that you have completed these exercises, return to the Essential Question. Would you like to modify or change your answer? Write any modifications to your answer below.

*Answers will vary.*



## **Instructional Intervention . . .**

Complete this part **after** the analysis of student work.

**Students have met the following criteria:**

**Students need to work on the following criteria:**

**My instructional interventions will include:**

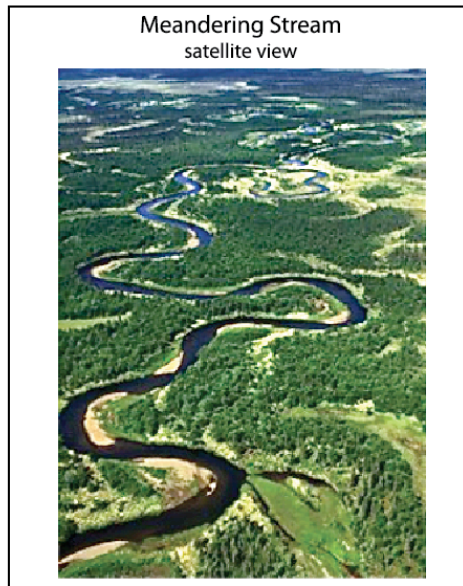
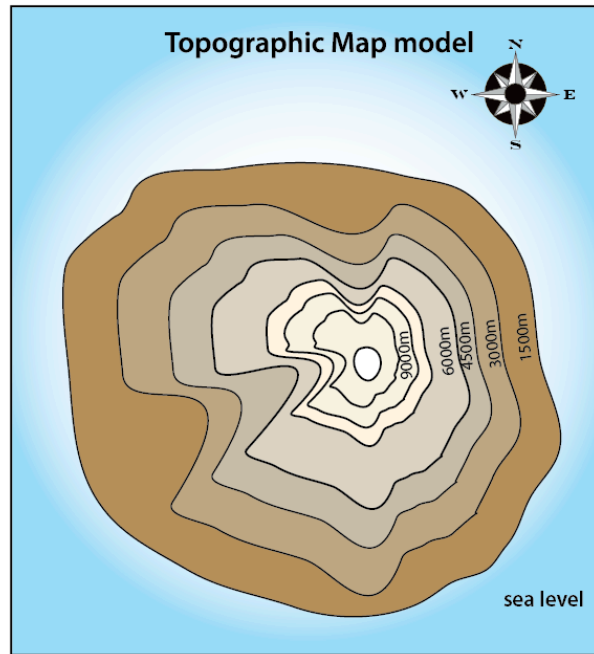


**Blackline Masters**

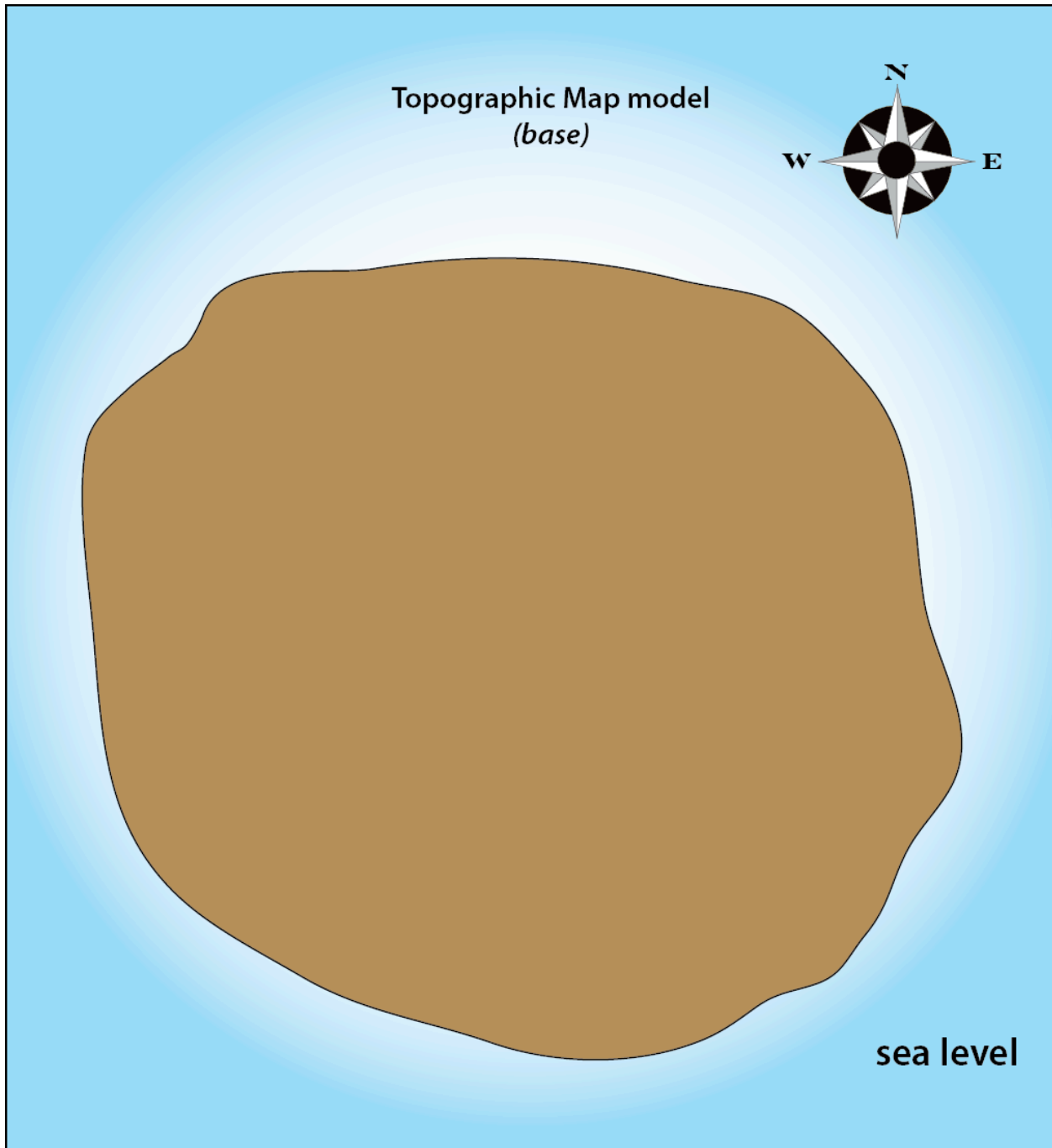
**Earth and Space:  
Topographic Maps —  
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### Station Information Sheet



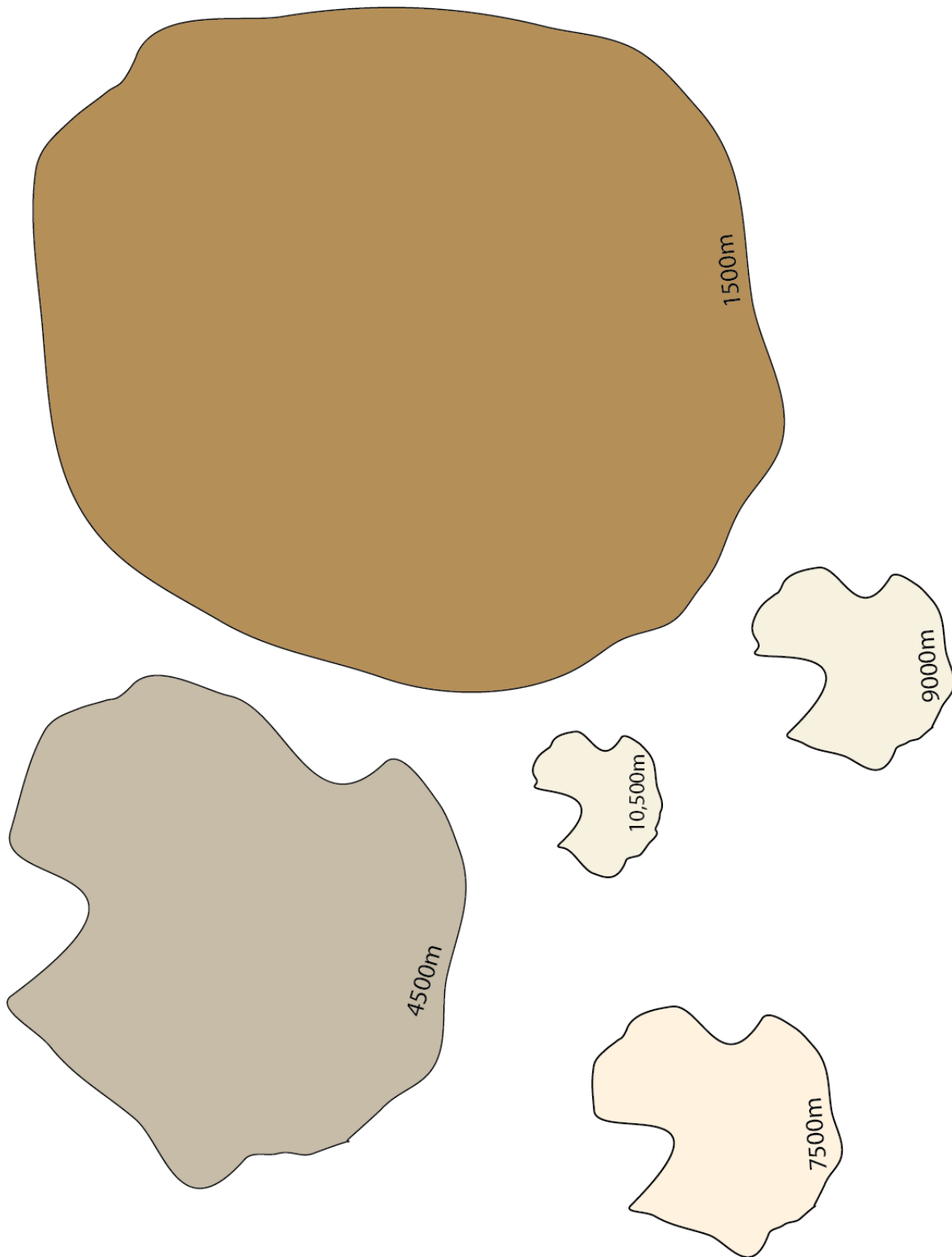






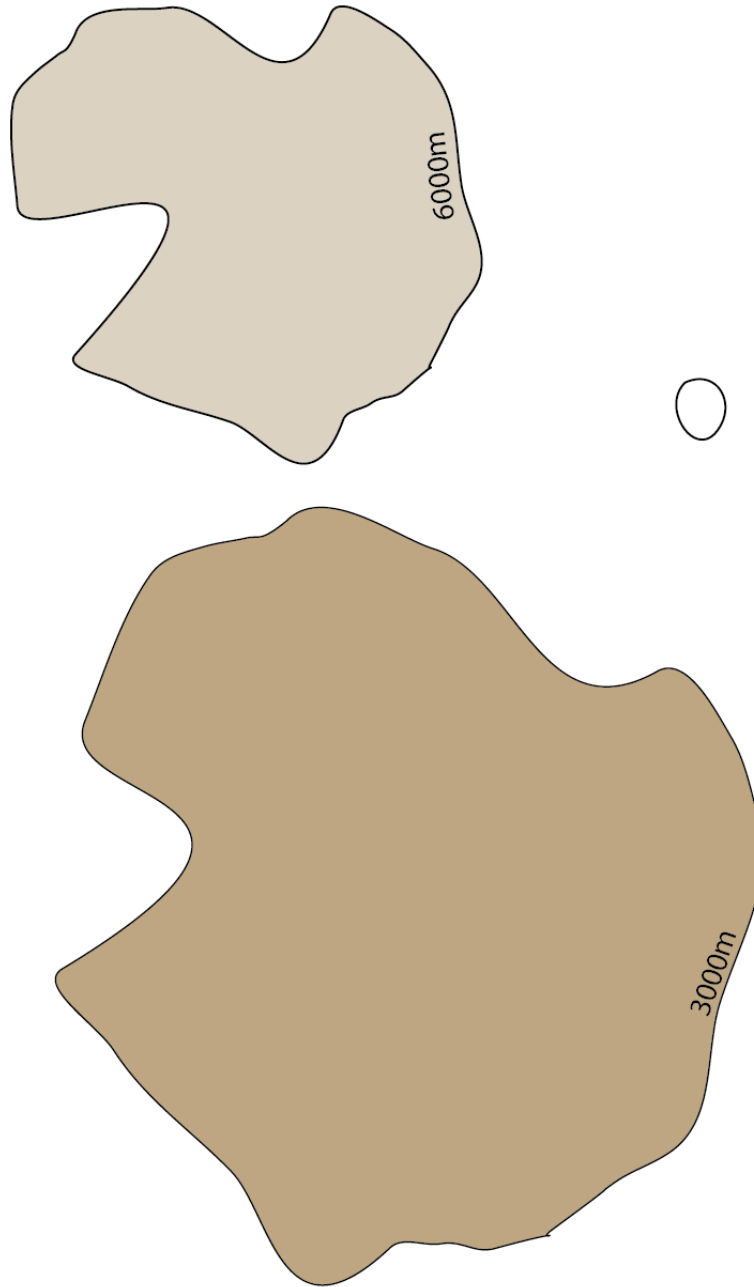


## Topographic Map Pieces 1

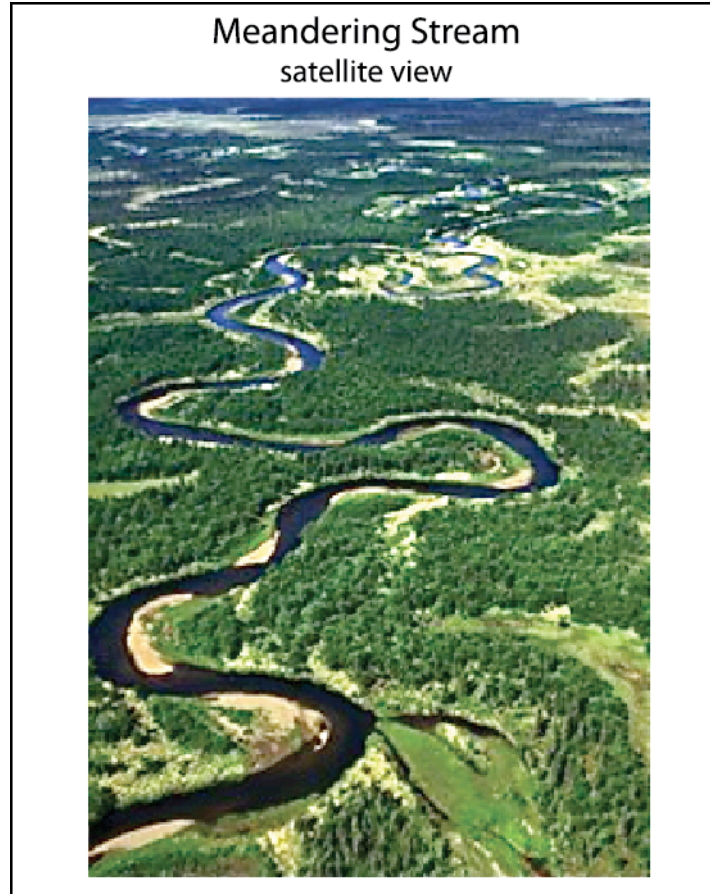




## Topographic Map Pieces 2









## ***Earth and Space***

# **Topographic Maps — Satellite Images**

## **Student Pages**

### **Purpose**

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### **Materials**

Station Information Sheet  
Topographic Map model  
Meandering Stream satellite view

### **Essential Question**

What can scientists learn by studying topographic maps and satellite images of a particular area of the Earth?

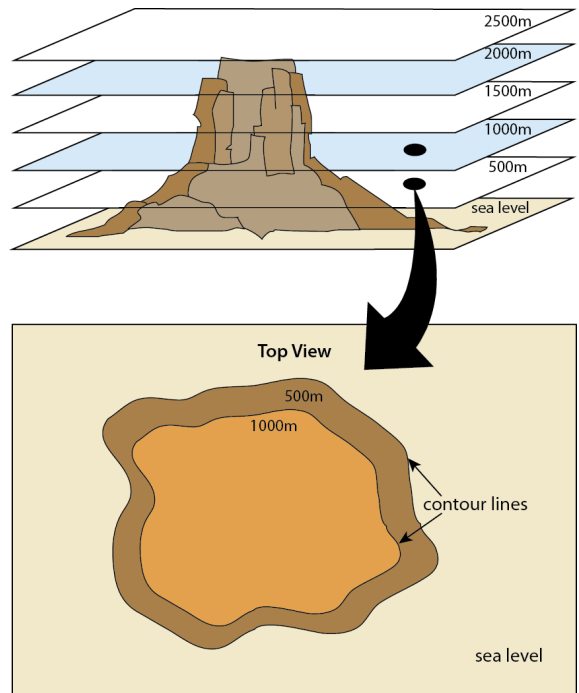
## **Part I: Topographic Maps**

### ***Procedures***

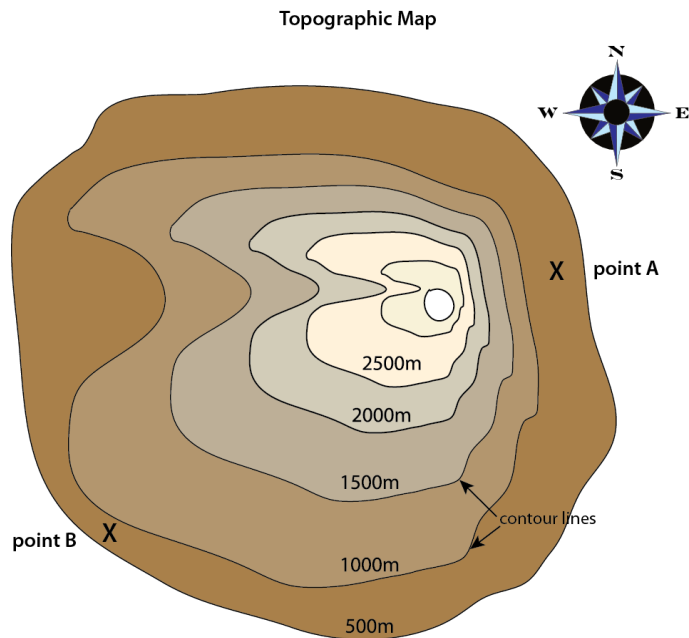
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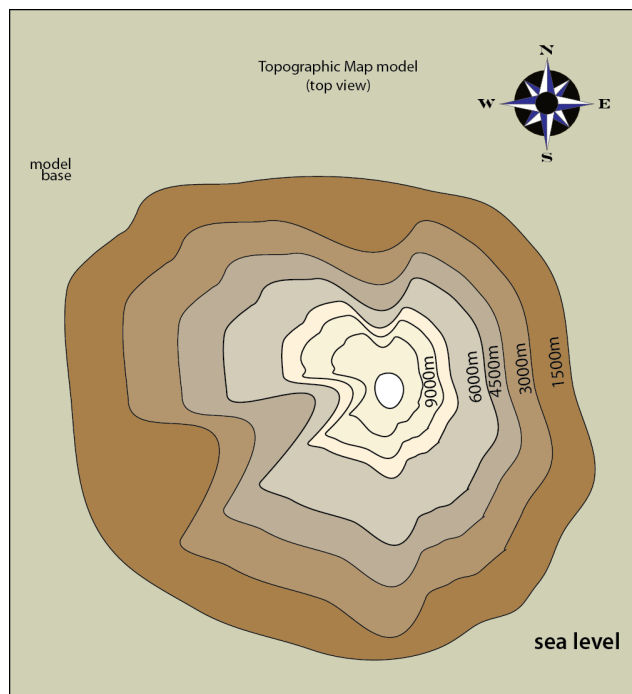


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1. If you and your partner were on a hike and arrived at this mountain, which would be the easier climb: beginning at point A on the east side and climbing to the top or starting at point B and climbing northeast to the top? Use data from the map to explain your reasoning.
2. What is the highest point above sea level on the mountain? What data from the map supports your answer?
3. Locate the **Topographic Map model** at your station.







## **Thinking about what I have learned . . .**

Complete this part **after** class discussion of this station.

I have met the following criteria:

I need to work on the following criteria:

The next thing that I will do is:

## **Glossary for Topographic Maps — Satellite Images**

### ***Contour line***

A contour line connects points of equal elevation on a map.

### ***Erosion***

Erosion occurs when wind, water, or ice wear away surface layers of soil and rock.

### ***Meandering rivers and streams***

Meandering rivers and streams curve back and forth across the landscape.

### ***Topographic map***

Topographic maps show natural features of a landscape, including changes in elevation.

### ***Weathering***

Weathering is the breaking down of rock due to environmental conditions.

