

# The Magnificent Seven

## Examples of Possible Geography Academic Standards to Incorporate:

As you read the activities, keep in mind the specific skills your students need to practice and master in the different grade levels and use them to guide your approach in how you present the activities and what you have the students do. We encourage you to add additional SPIs and Academic Vocabulary in your plans that are outside the specific ones listed below.

### Kindergarten:

- K.3.01 Understand how to use maps, globes, and other geographic representations, tools, and technologies to acquire, process and report information from a spatial perspective.
  - a. Explain what a globe and map represent.
  - b. Use personal directions such as up, down, left, right, near and far to describe relative direction.
- K.3.03 Demonstrate how to identify and locate major physical and political features on globes and maps.
  - a. Identify the concept of physical features as in mountains, plains, hills, oceans, and islands.
  - b. Describe how landforms and bodies of water influence where and how people live.
  - c. Describe personal connections to place, especially place as associated with immediate surroundings.

### 1<sup>st</sup> Grade:

- 1.3.01 Understand how to use maps, globes, and other geographic representations, tools, and technologies to acquire, process and report information from a spatial perspective.
  - a. Recognize that maps and globes are representations or models of specific places.
  - b. Locate their home, neighborhood, and school on a visual representation.
  - c. Use map symbols and legends to identify locations and directions.
  - d. Interpret symbols that represent various forms of geographic data and use these symbols to identify locations and directions."
- 1.3.02 Recognize how to identify and locate major physical and political features on maps and globes.
  - a. Define what cardinal directions are.
  - b. Locate places using cardinal directions on maps and globes.
  - c. Locate cities, states, countries, and continents on maps and globes and major bodies of water on maps and globes.
  - d. Describe the concept of human features as in cities, buildings, farms, roads, and railroads.
  - f. Identify the geographic location of the United States and Tennessee on a globe and a map.

### 2nd Grade:

- 2.3.01 Understand how to use maps, globes, and other geographic representations, tools, and technologies to acquire, process and report information from a spatial perspective.
  - a. Describe how the globe is a model of earth locating hemispheres, poles, and equator.
  - b. Recognize that natural regions are represented on different types of maps by showing physical features, climate, vegetation, and natural resources.
  - c. Subdivide the world by positioning the equator, continents, oceans, and hemispheres on a map and globe.
  - d. Recognize that a map contains elements such as title, scale, symbols, legends, grids, cardinal and intermediate direction."
- 2.3.02 Recognize the interaction between human and physical systems around the world.
  - a. Analyze how individuals and populations depend upon land resources.
  - b. Describe the importance of physical geographic features on defining communities.
  - c. Understand the earth-sun relationship such as the varying length of day.
  - d. Understand the rudimentary elements to the hydrologic cycle.
  - e. List earth's natural resources such as minerals, air, water, and land."
- 2.3.03 Demonstrate how to identify and locate major physical and political features on globes and maps.
  - a. Show how landmasses and bodies of water are represented on maps and globes.

#### 3rd Grade:

- 3.3.01 Understand how to use maps, globes, and other geographic representations, tools, and technologies to acquire, process and report information from a spatial perspective.
  - a. Show how the spatial elements of point, line, and area are used on a map or globe.
  - b. Explain the difference between relative and absolute locations.
  - c. Locate places on a map using cardinal and intermediate direction.
- 3.3.02 Recognize the interaction between human and physical systems around the world.
  - a. List the similarities and differences of local places and regions with other places and regions.
  - b. List the basic components of earth's physical systems (e.g., landforms, water, climate and weather, erosion and deposition).
  - d. Describe how environments and regions differ around the world.
- 3.3.03 Demonstrate how to identify and locate major physical and political features on globes and maps.
  - a. Locate the major cities of Tennessee and/or the world on a map or globe.
  - b. Describe the concept of formal (uniform) regions.
  - c. Define the characteristics that comprise a region.
  - d. Explain how change affects region and place over time.
  - e. Show the population distribution of the state, and country.
  - f. Differentiate between urban, suburban, and rural regions.

#### 4<sup>th</sup> Grade:

- 4.3.01 Understand how to use maps, globes, and other geographic representations, tools, and technologies to acquire, process and report information from a spatial perspective.

- a. Locate major countries of the world on a map or globe involved with early American development.
  - b. Locate places on a map using cardinal and intermediate directions, latitude and longitude, and time zones.
- 4.3.03 Understand how to identify and locate major physical and political features on globes and maps.
  - a. Explain how physical processes shape the continents features and patterns.
  - b. Understand the differences in early population characteristics of the countries and continents such as density, distribution, and growth rates.
  - c. Describe how geography affects the development of transportation and communication networks.

#### 5<sup>th</sup> Grade:

- 5.3.01 Understand how to use maps, globes, and other geographic representations, tools, and technologies to acquire, process and report information from a spatial perspective.
  - a. Locate the major physical features and cities of the United States on a map or globe.
  - b. Understand the latitude, longitude, the global grid and time zones of the sites within the United States and Tennessee.
  - c. Recognize landforms, climate, and natural resources as determining factors in the location and development of communities."
- 5.3.02 Recognize the interaction between human and physical systems around the world.
  - b. Explain human modifications of the physical environment.
  - c. Recognize the impact of extreme natural events on human history.
- 5.3.03 Demonstrate how to identify and locate major physical and political features on globes and maps.

#### 6th Grade:

- 6.3.01 Understand the characteristics and uses of maps.
  - a. Use the basic elements of maps and mapping.
  - b. Identify the locations of certain physical and human features and events on maps and globes.
- 6.3.02 Know the location of places and geographic features, both physical and human.
  - a. Identify the location of earth's major landforms such as continents, islands, and mountain ranges, and major bodies of water such as the oceans, seas, rivers, and gulfs.
  - b. Describe the location of major physical characteristics such as landforms, climate, soils, water, features, vegetation, resources, and animal life, and human characteristics such as language groups, religions, political systems, economic systems, and population centers in the world.
  - c. Explain how and why the location of geographic features both physical and human in the world change over time and space."
- 6.3.03 Understand the characteristics and uses of spatial organization of Earth's surface.
  - a. Identify concepts that define and describe spatial organization such as location, distance, direction, scale, movement and region.

- b. Explain how changing technology such as transportation and communication technology affect spatial relationships."
- 6.3.04 Understand the physical and human characteristics of place.
  - a. Describe how physical and human processes shape the characteristics of a place.
  - b. Explain how technology shapes the physical and human characteristics of places.
  - c. Explain why places have specific physical and human characteristics in different parts of the world.

7<sup>th</sup> Grade:

- 7.3.01 Understand the characteristics and uses of maps, globes, and other geographic tools and technologies.
  - a. Identify, describe, and be able to use the basic elements of maps and mapping.
  - b. Identify the location of physical and human attributes on maps and globes at local, regional, and global scales.
  - c. Demonstrate an understanding of various types of maps including thematic and topographic maps.
  - d. Discuss applications of current geographic techniques in mapping such as GIS and GPS.
- 7.3.02 Know the location of places and geographic features, both physical and human, locally, regionally and globally.
  - a. Identify the location of Earth's major physical characteristics such as continents, landforms, bodies of water, climate regions, vegetation, and natural resources.
  - b. Identify the location and size of major human features such as cities, political units, and countries.
  - c. Explain why physical, biological and human processes leave discernable patterns on the Earth's surface locally, regionally, and globally.
  - d. Identify the spatial distribution of major ecosystems such as tropical rainforest, desert and grassland."
- 7.3.03 Understand the characteristics and uses of spatial organization of Earth's surface.
  - a. Identify concepts and geographic tools used to define and describe spatial organization such as absolute and relative location, distance, direction, scale, movement and region.
- 7.3.04 Understand the physical and human characteristics of place.
  - a. Identify which features on Earth's surface are physical and which are human.
  - b. Describe how physical, biological, and human characteristics and processes define and shape a place.
- 7.3.05 Understand that common physical and cultural characteristics create regions.
  - a. Identify the criteria used to define a region, including physical traits and formal, functional, and vernacular cultural regions.
  - b. Describe types of regions at the local, regional, and global level.
  - c. Describe how cultures influence the characteristics of regions and how human characteristics make specific regions of the world distinctive.

- d. Explain factors that contribute to changing regional characteristics and boundaries."
- 7.3.06 Understand how physical processes shape the Earth's natural landscapes and affect environments.
  - a. Identify types of Earth's physical processes such as tectonic activity, changing landforms.
  - b. Consider the effect of weathering and erosion, the hydrologic cycle and climate change.
  - c. Analyze physical patterns and ecosystems found locally, regionally, and globally.
  - d. Examine the consequences of a specific physical process operating on Earth's surface.
- 7.3.07 Understand how physical systems and the physical environment affect human systems.
  - a. Describe how the characteristics of different physical environments affect human activities including ways in which people adapt to living in different physical environments.
  - b. Describe the impact and interaction of natural hazards and disasters on human settlements and systems.
  - c. Evaluate the limits and opportunities of physical environments for human activities.

#### 8th Grade:

- 8.3.01 Understand how to use maps, globes, and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective.
  - a. Locate major countries and regions of the world on a map or globe.
- 8.3.02 Know the location of places and geographic features, both physical and human, in Tennessee and the United States.
  - a. Identify major landforms, bodies of water, cities, and states.
  - b. Identify the physical, economic, and cultural regions of the United States.
  - c. Explain the factors that contribute to the placement of cities and boundaries.
- 8.3.03 Recognize the interaction between human and physical systems.
  - c. Describe how geographic features affect the development of transportation and communication networks.
  - d. Explain the influences of geographic features both physical and human on historical events.

#### High School: Geography

- 3.1 understand the characteristics and uses of maps, globes, and other geographic tools and technologies.
  - Level One: Describe the basic elements of maps and mapping; compare and contrast various types of maps, including thematic and topographic maps; explain the purposes and distinguishing characteristics of different map projections.
  - Level Three: analyze the advantages and disadvantages of using maps from different sources and different points of view; construct maps and other geographic representations using primary data.
- 3.2 know the location of places, geographic features, and patterns of the environment, both physical and human, locally, regionally, and globally.

- Level 1, the student is able to describe the relative location of, size of, and distances between Earth's major physical, biological, and human geographic features.
- At Level 2, the student is able to describe the approximate locations of major political and economic cultures; describe the spatial dynamics of various contemporary events.
- 3.3 understand the characteristics and uses of spatial organization of Earth's surface.
  - At Level 1, the student is able to describe concepts and geographic tools used to define and describe spatial organization such as absolute and relative location, distance, direction, scale, movement and region.
  - At Level 2, the student is able to analyze patterns of spatial organization including why some areas are more densely populated than others and the differences between rural, urban, and suburban patterns
- 3.6 understand how physical processes shape Earth's natural landscapes and affect environments.
  - At Level 1, the student is able to describe ways in which different types of physical processes create and shape patterns in Earth's physical environments.
  - At Level 2, the student is able to predict the consequences of specific physical processes operating on Earth's surface; explain how physical processes affect different regions of the world; explain and analyze the distribution of different physical processes (e.g., tectonic activity, different types of weather and climatic patterns, vegetation patterns); explain the distribution of Earth's various ecosystems.

# The Magnificent Seven

There are many excellent resources available that can serve to introduce the subject matter, for example. The *Amazing Pop-Up Geography Book* by Kate Petty, *Me on the Map* by Joan Sweeney or *Where Do I Live?* by Neil Chesanow.

It's a small world, a wild world, and a world of wonder. It's our very own big blue marble in the black velvet of space, and your students get to learn all about it: its countries and states, topography and habitats, cultures and people, themselves included. And they can start right here with the biggest sections of all.

The continents are the great land masses of the earth. There is no standard definition for the number of continents but you will commonly find that the numbers six or seven are used. Sometimes they can be a little confusing. Some are joined to each other, and some are completely surrounded by water. Some contain a lot of countries, and some only a few. Some people even like to argue that there are only six continents and not seven.

By most standards, there are a seven continents - Africa, Antarctica, Asia, Australia (when Australia, New Zealand and Papua New Guinea are considered together many people call the continent Oceania), Europe, North America, and South America. Most students in the United States are taught that there are seven continents.

## European Division of Continents

In Europe and other parts of the world, many students are taught of six continents, where North and South America are combined to form a single continent of America. Thus, these six continents are Africa, America, Antarctica, Asia, Australia, and Europe.

Many scientists now refer to six continents, where Europe and Asia are combined (since they're one solid geologic landmass). Thus, these six continents are Africa, Antarctica, Australia, Eurasia, North America, and South America.



### Did You Know?

Geography can make a "world" of difference in students' knowledge of the world *and* in their test scores. That's because geography is multidisciplinary by nature. Can your students locate Afghanistan on a world map? In survey results released last November, during Geography Awareness Week, fewer than one in five U.S. adults ages 18-24 could pinpoint Afghanistan.

That National Geographic-Roper Global Geographic Literacy Survey polled more than 3,000 18- to 24-year-olds in Canada, France, Germany, Great Britain, Italy, Japan, Mexico, Sweden and the United States. Sweden scored highest; Mexico, lowest. The United States was next to last.

Geography is an interdisciplinary discipline in so many ways; it involves math, language, history, literature, and many other curriculum areas. That's why geography is such a great vehicle for improving student skills and why we would be wise to work geography into our lessons.

*When introducing continents- draw them on an orange (the world) with a marker (very basic drawing), slice the orange, and lay it flat, this helps the kids make the connection that a flat map of the world can represent a round world, which understanding will come into play later.*

Geographers divide the planet into regions, and generally not continents, for ease of study. Various geographers have various definitions of these world regions. The Official Listing of Countries by Region divides the world into eight regions: Asia, the Middle East and North Africa, Europe, North America, Central America and the Caribbean, South America, Africa, and Australia and Oceania.

## It's All Its Own Fault: Teetering on the Edge and Drifting Away

Ever hear about a big temblor in North Dakota? Probably not. There have been virtually no sizable earthquakes in North Dakota during modern history. Just 1200 miles away, in central California, there's a minor shaker every few weeks. A quick glance at a map of recent earthquake activity in the United States will almost always show a cluster of activity in the western part of the country and very little elsewhere. The same is true for other regions of the globe—some, like Central Asia, have lots of earthquakes. Others, like Australia, have almost none. Why do some people have all the fun?

The answer is that some places on the earth's surface are, literally, on the edge. The Earth's crust is not a solid shell. During its early years, the earth's outer layer was much hotter than it is today. Over time, the surface of the earth cooled and hardened. Cracks formed in the hardened surface, creating incredibly huge plates of rock, called tectonic plates, that fit together like a puzzle. They move atop the underlying mantle, a really thick layer of hot flowing rock. These plates carry the continents and make up the ocean floor, floating like islands on the hot, taffy-like rock below. Where the edges of those plates meet, the huge slabs bash into each other, grinding, rumpling, scraping, and generally shoving each other around. We experience the more dramatic of these encounters as earthquakes.

These collisions are more than just momentary shake-ups. They are the forces that shape mountains, create volcanoes, and generally affect what the map of the earth looks like. In fact, look at a map and you can see evidence of how the continents have moved around. It's not a coincidence that South America and Africa look like puzzle pieces that could fit together. They, like all the other continents, were once stuck together in a giant supercontinent that scientists call Pangaea. Over the last 200 million years, the continents have moved apart. While we think of their locations now as permanent, they are actually moving around very slowly, on average about 2 inches (5cm) a year.



225 Million Years Ago



135 Million Years Ago



Present Day

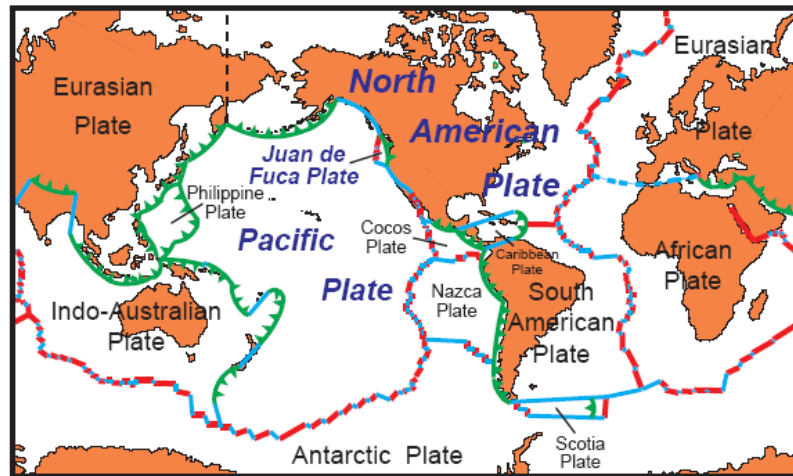
## Getting Technical



**Tectonics: the study of large features on Earth's surface and the processes that formed them.**

The theory that describes this movement is called plate tectonics. The term tectonics originates from the Greek word "tektōn," referring to a builder or architect. Plate tectonics suggests that large features on Earth's surface, such as continents, ocean basins, and mountain ranges, result from interactions along the edges of large plates of Earth's outer shell, called the lithosphere (Greek "lithos," hard rock).

The plates, composed of Earth's crust and uppermost mantle, ride on a warmer, softer layer of the mantle, the asthenosphere (Greek "asthenos," lacking strength). Earth's lithosphere is broken into a mosaic of seven major and several minor plates



Relative motions between plates define three types of boundaries: divergent, where plates rip apart, creating new lithosphere; convergent, where one plate dives beneath the other and lithosphere is destroyed; transform, where plates slide past one another, neither creating nor destroying lithosphere. Another large-scale feature is a hotspot, where a plate rides over a fixed "plume" of hot mantle, creating a line of volcanoes.

Plate tectonics is the outcome of thinking that began with an idea posed by German meteorologist Alfred Wegener in 1915. Wegener saw that the continents of the globe looked like a puzzle that had broken apart, and he believed this was because they once been one large continent that had later split up. He gathered a great deal of evidence to support his theory of continental drift. But because he couldn't explain how the continents moved, most geologists at the time didn't agree with him. Twenty-five years after Wegener's death, scientists discovered a deep trench beneath the Atlantic Ocean where molten rock from inside the earth welled up and then cooled in the ocean waters, creating new rock. This led them to an observation: If the earth is creating new seafloor, old seafloor must be disappearing, or the earth would grow. So what's happening? The answer is that the new seafloor is being created at the edge of a tectonic plate. These plates are constantly in motion due to the convection currents of the Earth, which are caused by heat cycles in the mantle, the fluid layer beneath the Earth's crust. At the bottom of the mantle, the fluid gets extremely hot due to its proximity to the core. The hot liquid rises to the top of the mantle, where it then cools. Once it cools, it returns to the bottom, completing the cycle. This movement creates what is known as convection currents, which causes the tectonic plates to move. The plate's opposite edge is moving away from the new seafloor, diving under the plate it is bumping up against in a process called subduction. Researchers recognized

this as an engine that could move continents, and realized in the 1960s that Wegener had been right all along.

## Model Behavior: Tectonic Plate Movement

### Simulation

*\*Excerpted and modified from "Parks and Plates: The Geology of Our National Parks, Monuments, and Seashores," by Robert J. Lillie, in press, 2004, New York: W. W. Norton and Company.*

<http://dusk.geo.orst.edu/oceans/Oreo-Cookie.pdf>

Students will learn that the crust of the earth is broken into plates and that they move slowly over time. Students will learn that the effects of plate movement determine various geologic activity on the planet and the current formations of the continents.



### Materials:

- Each student should have ONE double-stuff Oreo cookie

Discuss with students how an Oreo cookie might become a model of the Earth. Remind them of the make-up of the Earth's layers: core, mantle, crust. Focus mainly on the mantle and its semi-liquid molten make-up and the crust (thin layer on the surface of the earth broken into plates). Show the cross-section of the earth's interior, ex. the Oreo.

Pass to each student an Oreo and a napkin and explain that they are not to touch or eat them yet. (It's best if the Oreos are room temp/warm so the center is soft).

1. Explain that the plates move upon the semi-liquid mantle around the surface of the earth.
2. The upper cookie is the ***lithosphere***, the creamy filling the ***asthenosphere***, and the lower cookie the ***lower mantle***. (Be sure to get the "Double Stuff" variety, which has adequate asthenosphere)!

***Sliding Plate Over  
Asthenosphere***



***a) Divergent  
Plate Boundary***



***b) Convergent  
Plate Boundary***



***c) Transform  
Plate Boundary***



3. First, carefully remove the upper cookie (a “twisting” motion is required). Slide the upper cookie over the creamy filling to simulate motion of a rigid lithospheric plate over the softer asthenosphere.
4. Next, break the upper cookie in half. As you do so, listen to the sound it makes. What does that sound represent? (An earthquake. Message: it takes cold, brittle lithosphere to make earthquakes – earthquakes do not occur in the soft, flowing asthenosphere. Teachable moment: some cookies will break in two easily while others may crumble: you can use this to explain that the crust is brittle in some areas and stronger in others).
5. To simulate a **divergent plate boundary**, push down on the two broken cookie halves and slide them apart. Notice that the creamy filling between the two broken “plates” may tend to flow upward, similar to the rising, decompression, and partial melting of hot asthenosphere at mid-ocean ridges and continental rift zones.
6. Push one cookie piece beneath the other to make a **convergent plate boundary**. Note that this is the only situation where the cold, brittle lithosphere extends to great depths, and hence the only place where deep earthquakes occur. The very largest earthquakes are at subduction zones where two plates get stuck together for centuries, then suddenly let go.
7. Simulate a **transform plate boundary** by sliding the two cookie pieces laterally past one another, over the creamy filling. You can feel and hear that the “plates” do not slide smoothly past one another, but rather stick then let go, stick then let go. The cracking sound you hear each time is like an earthquake occurring along the San Andreas Fault in California.
8. A **hotspot** can be simulated with the demonstration in the upper left photo. Imagine if a piece of hot, glowing coal were imbedded in the creamy filling – a chain of “volcanoes” would be burned into the overriding cookie.

## The Breakup of Pangaea

[from the Exploratorium Tectonics page in Quake Basics]

Scientists in Antarctica have found fossils of tropical plants near the frozen South Pole. Many of the fossilized plants and animals found in Antarctica compare closely with specimens found in other southern continents—but not in northern continents. Fossils found in Antarctic soil indicate that the now frigid continent was once lush with trees and ferns, and home to dinosaurs, amphibians, and later, marsupials. How could that happen? The following illustrations show the breakup of the supercontinent Pangaea 225–200 million years ago, according to Wegener's theory of continental drift. This theory explains not only fossils in Antarctica, but also the current shape of the continents.

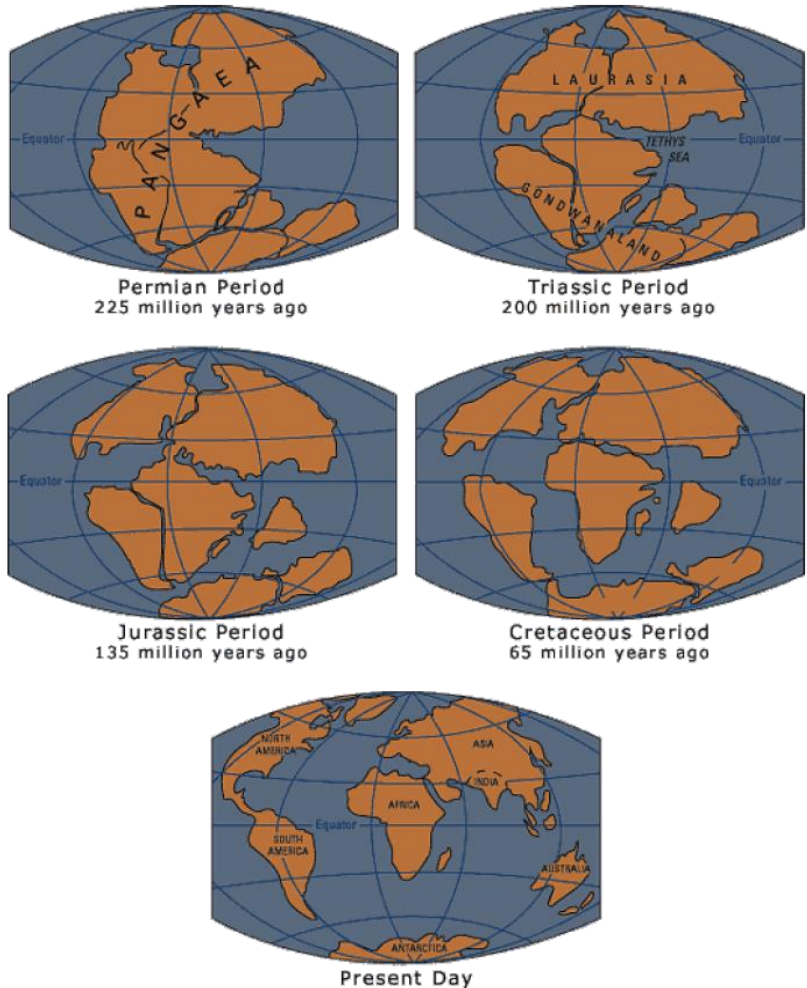
Can you see how the pieces of the earth fit together by looking at these maps? How was the Indian Subcontinent formed? How does this account for the large mountain range and high number of earthquakes in the area north of India? How did those marsupials live in Antarctica and then where did they go? Possible Answer: As

Antarctica drifted poleward, cooler temperatures prevailed and plant and animal life dwindled as glaciers covered the continent.

The current continental and oceanic plates include: the Eurasian plate, Australian-Indian plate, Philippine plate, Pacific plate, Juan de Fuca plate, Nazca plate, Cocos plate, North American plates, Caribbean plate, South American plate, African plate, Arabian plate, and the Antarctic plate. These plates consist of smaller sub-plates.

Most seismic action arises not from diverging plates, but from plates of the earth striking each other. These collisions create land features like mountains and volcanoes, and unleash the forces of earthquakes and tsunamis. Plates that grind past each other can also unleash powerful earthquakes, like the one that occurred in San Francisco in 1906.

The outcome of these bumps and grinds depends on the angles at which the plates meet and which directions they're moving, like those in the cookie simulation. These factors characterize the action at a fault zone.



## A Plate Tectonic Puzzle

Source: © 2007 American Museum of Natural History. All Rights Reserved. [www.amnh.org](http://www.amnh.org)

Students will:

- use logic and the evidence to reconstruct the position of large islands and continents as they appeared 220 million years ago.

- understand the theory of continental movement and plate tectonics.
- describe how scientists use different kinds of evidence to form theories.

After introducing students to the concept of continental movement and plate tectonics call on volunteers to tell what they remember about plate tectonics. Display a globe or world map. Have students look carefully at the continents. Discuss with them how Europe, Africa, South America, and North America might fit together as puzzle pieces. Discuss what might explain this fit. Remind them that millions of years ago the continents were joined together in one supercontinent called Pangaea. Using some of the same evidence that scientists use, they will reconstruct this supercontinent.

### Exploration

1. Have students work in pairs. Distribute the materials to each pair. Review the instructions with students.
  2. Explain that the landmasses they will be cutting out represent the continents and some of the larger islands of the Earth the way scientists think they appeared 220 million years ago. On a separate sheet of paper, have students draw a large circle, about 8 inches in diameter, to represent the globe. Then have them cut them out the islands and continents. Using the legend on the instructions page, call on volunteers to identify what each symbol stands for.
  3. Tell students they are going to use the evidence (symbols) on the continents and islands to reconstruct Pangaea, the supercontinent. Using the globe or world map as a reference, discuss with students in what general area the continents should be positioned. Ask them to identify what they should look for to determine which continental boundaries should be joined.
  4. Using the physical shape of continents, age of rock layers, fossilized desert belts, and the distribution of fossils, have partners fit together the continents and islands. Remind them that not all the boundaries may touch and that there might be areas of water separating some of them. Once students are sure the landmasses are in the correct position, have them tape or glue them onto the world map. Have them label their maps along with the time period.
- When students have completed the activity, have them compare their world maps. Call on pairs to discuss how they reconstructed the supercontinent and what evidence led to their decisions. Call on volunteers to identify the continents and islands.
7. Display the answer page and have students compare it to their completed Pangaea maps.

Student Instructions: Solve the puzzle to discover what the Earth looked like 220 million years ago.

### Did You Know?

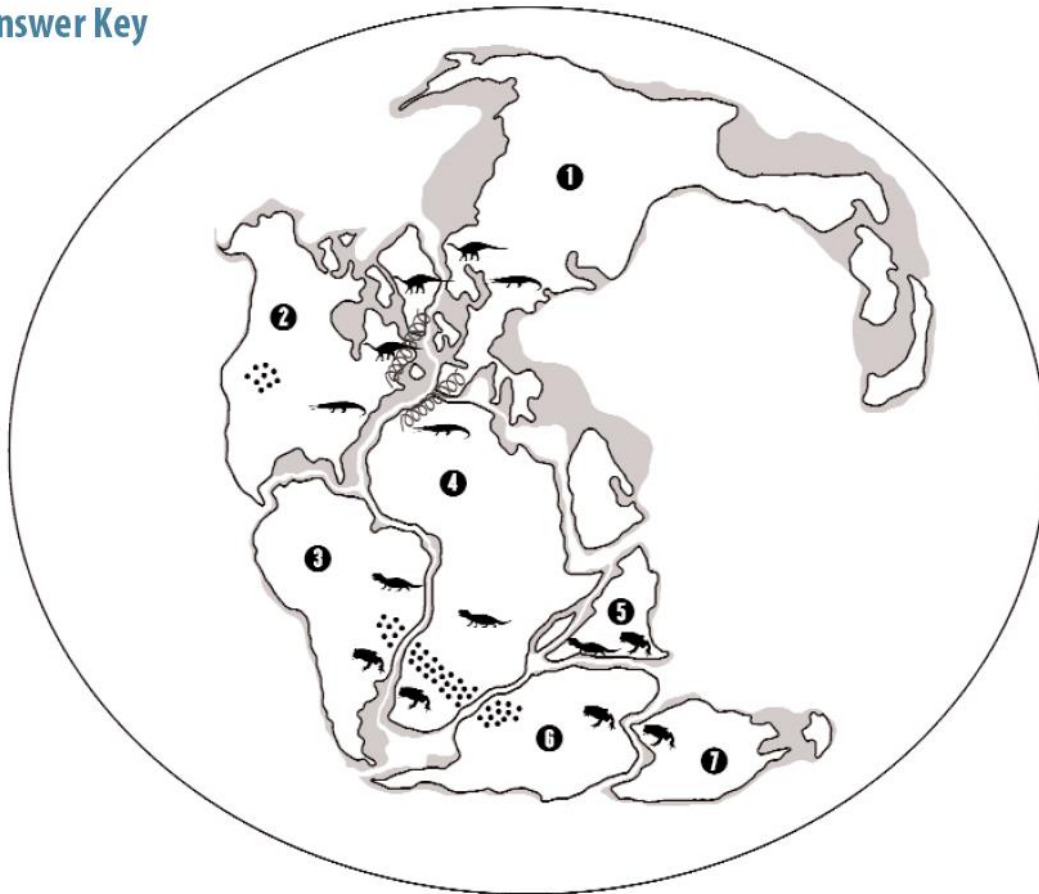
- Tectonic plates are made of both continental and oceanic crust. The land that we see is the continental crust, about 30 kilometers (19 mi) thick. Under the sea, the heavier oceanic crust is much thinner, about 8 to 10 kilometers (5 to 6 mi) thick.
- Plates move about 8 centimeters (3 in) per year. That's about as fast as a fingernail grows in a year!
- The tallest mountains in the world are still growing. About 60 million years ago, the Himalayan Mountains formed when the Indian Plate crashed into the Eurasian Plate. Today the two plates are still colliding and the Himalayas continue to rise.
- Los Angeles sits on the Pacific Plate that is moving northwest and San Francisco sits on the North American Plate that is moving southeast. Moving towards each other at the rate of 5 centimeters (2 in) a year, someday these two cities may be neighbors!

1. What's the code? Use the legend to identify the symbols on each island or continent.
2. Puzzle me this. Look at the shapes of continents and islands. What landmasses seem to fit together?
3. Let's rock! Examine the evidence and try to match up landmass boundaries that show similar rock strata, fossilized desert belts, and dinosaur fossils.
4. Hold that Pose. Look over the arrangement of the continents and islands and decide if the position of any of them should change. When you are satisfied with your map of Pangaea, tape or glue it down on the world map.

### Extension

Students can further explore plate tectonics by visiting Plates on the Move ([ology.amnh.org/earth/plates](http://ology.amnh.org/earth/plates)) on OLogy, the Museum's website for kids. This interactive feature examines the huge impact that plate tectonics has on the Earth, including the formation of oceans, continents, and mountains, and the occurrence of events such as earthquakes and volcanic eruptions.

### Answer Key



# A Plate Tectonics Puzzle

## LEGEND

① Europe & Asia

④ Africa

⑦ Australia

 basalt


 *Plateosaurus*

② North America

⑤ India

 landmasses  
BELOW sea level

 desert

 *Phytosaur*

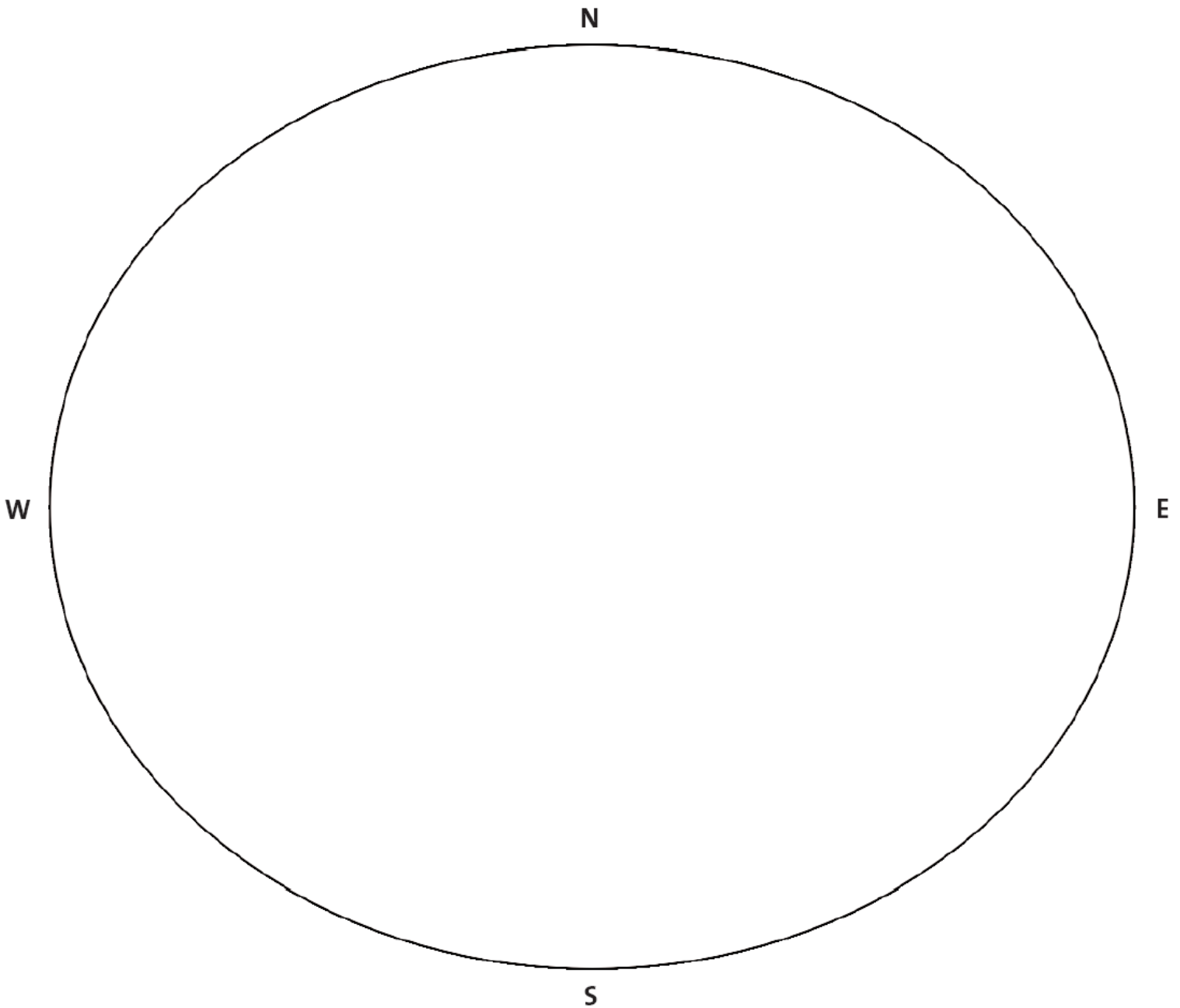
③ South America

⑥ Antarctica

 landmasses  
ABOVE sea level

 amphibian

 *Rhynchosaur*

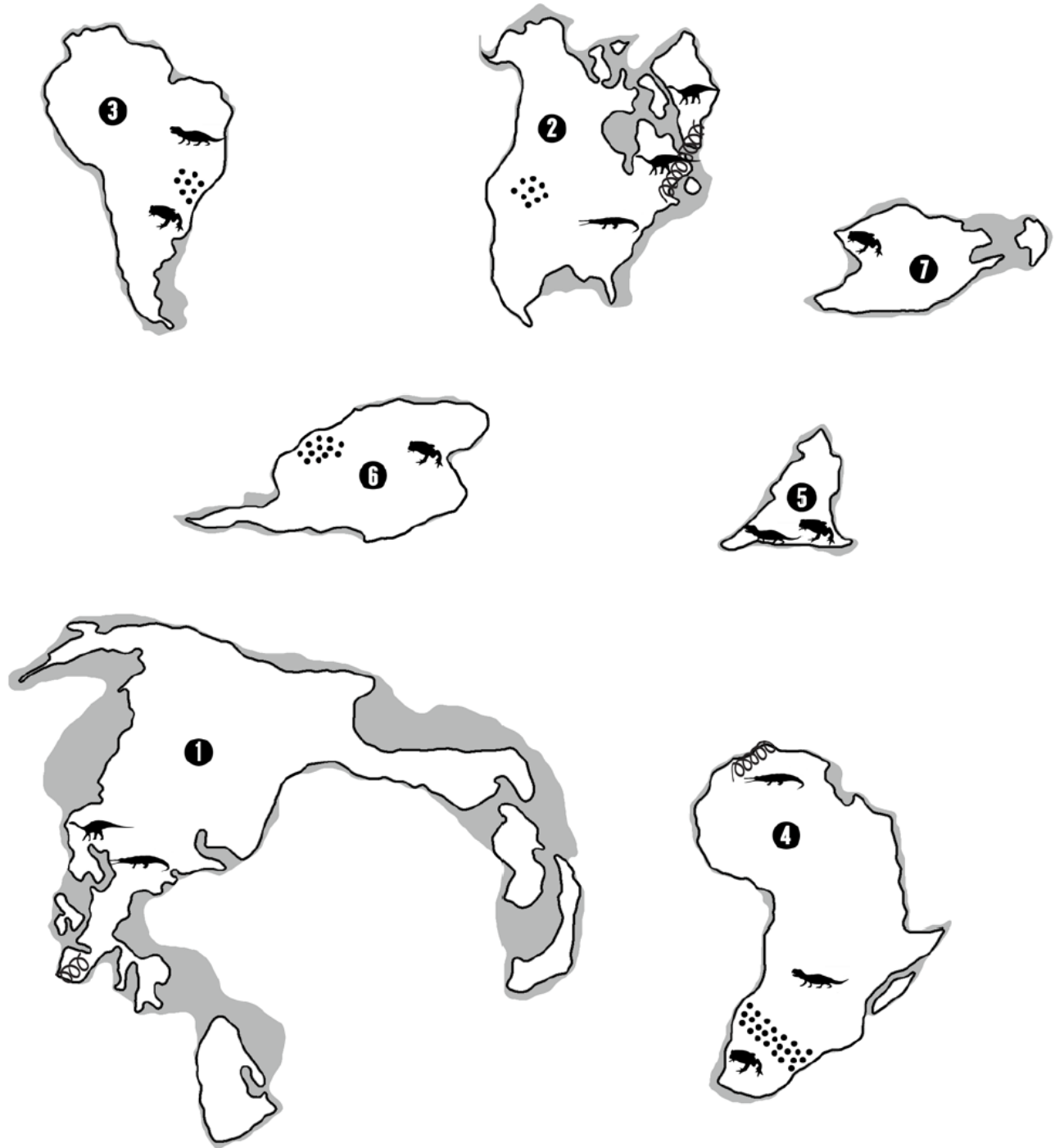






# A Plate Tectonics Puzzle

LANDMASSES TO CUT OUT



# Topographical Maps

Fed up with flat maps? They just don't always provide the information you're trying to convey and with their rainbow blobs defining borders young children often wonder if China, Chile, and Madagascar have something in common because they are all canary yellow.

Practice: Topographical maps are a great way to show kids how three-dimensional objects can be represented on a two-dimensional page.

Gather a set of topographic maps for students to examine. Display a raised relief map if you have one. You will want to try this activity yourself before you do it with the students. The model you make from the topo map can serve as an example for your students to emulate.



## Materials:

- Modeling clay
  - Sharp paring knife or plastic knives (under supervision), or smooth dental floss
  - Paper
  - Pencil
1. Have students work in small groups, pairs, or individually.
  2. Ask your students to shape their own mountain out of the modeling clay. Encourage them to make the mountain an interesting shape, rather than perfectly symmetrical.
  3. Once finished, have your students take the pencil and push two holes in the top of their mountain all the way down to the bottom. Then, use the pencil to make horizontal markings on the clay from top to bottom about one inch apart.
  4. Assisting your students with a knife or dental floss cut the top most slice of the mountain. Go slowly and carefully so as not to smooch their mountain! With dental floss, simply put tension on the floss and steadily pull through to make a slice.
  5. Have students put the first slice on their piece of paper, and have their partner trace, or they can trace around it. Then have them color where the two holes in the clay appear on the paper. Place the first slice aside.
  6. Now they will cut their second slice and again trace on the paper. Be sure to line up the holes in the clay with the holes on the paper. Put the second slice aside. Repeat with the rest of your slices.

## Cardstock Method: Making Models from a Topo Map

1. Make a bunch of balls of clay approximately 1 cm tall.
2. On the photocopy of the map, write an "N" on the inside of each contour line on the North side of the island.
3. Hold the photocopy tightly on top of a piece of cardstock. Cut both the photocopy and the cardstock together along the outermost contour line. Label the north side of the cardstock with an N. Set this piece aside.
4. Hold the now smaller photocopy onto a new section of the cardstock and cut out the next contour line and label the north side. Stack this new piece of cardstock on top of the first using some clay balls as spacers to raise it up off the first.
5. Continue cutting out pieces of cardstock and stacking them until all contour lines have been cut out.

7. Now have your students put their mountain back together again, and compare the model with their topographic representation. Does the map look like their mountain? Can they find the steepest side? The most gradual slope? The highest point?
8. Make a photocopy of each map. The original map should be left as untouched as possible while the photocopy is a working copy that may be cut up if necessary.
9. Using one of the students' topo maps, demonstrate how to make a model from a topo map.
10. Give each group the original and photocopy of a different group's topo map as well as the other materials, each group is then challenged to turn the 2 dimensional map back into a 3 dimensional landform with foam sheets, clay, or clay and cardstock. If you want, have students use the maps to predict what the model will look like before they actually make the model.
11. Once all the models have been completed, put the original model, the map, and the second model side by side. Were there any problems? How similar are the two models? How are they different? Why aren't they exactly the same? Look at the models to discover how different features (hills, valleys, ridges, plateaus, etc.) appear on the maps.
12. If there is time, go back to the example topo maps that were shown at the very beginning of this lesson. See whether students are able to identify elevations, features, and identify trends on the maps now. Ask them to identify different features: the tallest hill, the steepest part, the flattest part, the elevation of various points, streams, etc.
13. Discuss with your students why and how a topo map might be a useful tool.

While modeling clay is usually endless fun all by itself, there's also important lifetime learning here. Maps provide abstract representation of all the earth's surfaces, and they'll show up in textbooks, classrooms, and all sorts of newspapers and magazines for years to come. With practice, your students will become fully comfortable with maps of all kinds.

## Constructing the Magnificent Seven

Landform and map projects teach children about the how continents, islands, and other land masses take shape and are identified. Children will also come to understand different terrains by creating visual representations of land characteristics, such as mountains, lakes, and forests. Projects that include the physical specifics of a given geographical location will help children grasp differences in environments and land forms



Topographical relief map is more than just a map. It is a highly visual and tactile way to communicate information pertaining to the planet's landforms, physical features and climate. Relief maps are three-dimensional representations of a landscape and can be accomplished in a fairly short amount of time. They are excellent map projects for elementary age children on up through high school.

### Materials:

- Foam core board, 11 by 17 inches
- Tape
- Sharpened pencil
- Acrylic paint in blue, green, brown, yellow and white
- Paintbrushes
- 2 lbs. brown air dry modeling clay
- 2 lbs. green air dry modeling clay or cold porcelain
- 1lb. blue air dry modeling clay or cold porcelain
- 1 lb. white air dry modeling clay or cold porcelain
- 1 lb. yellow air dry modeling clay or cold porcelain
- Rolling pin
- Plastic fork
- Plastic knife
- Plastic spoon
- Toothpicks
- Scissors
- Sieve with small holes
- Cotton
- Beans
- Rice
- Dried grass or hay

\* If modeling clay is not available, make a simple dough out of 4 cups of flour, 2 cups of water, 2 cups of salt and 2 tbsp. cream of tartar. Mix and add food coloring.

\*With cold porcelain: Objects dry to a light-weight, stone like texture.

Create an interactive resource for students, to help them, by posting a colored landform map with removable names of the mountain ranges and geographical terms. Instead of sketching a map, consider enlarging and printing a blank map of the continent, with only the lines and borders defined. Details such as mountain ranges and rivers can be filled in later. Add the names of geographical regions as they are taught. For younger students avoid adding too much detail to the landform maps; younger students might get distracted by complicated color patterns.

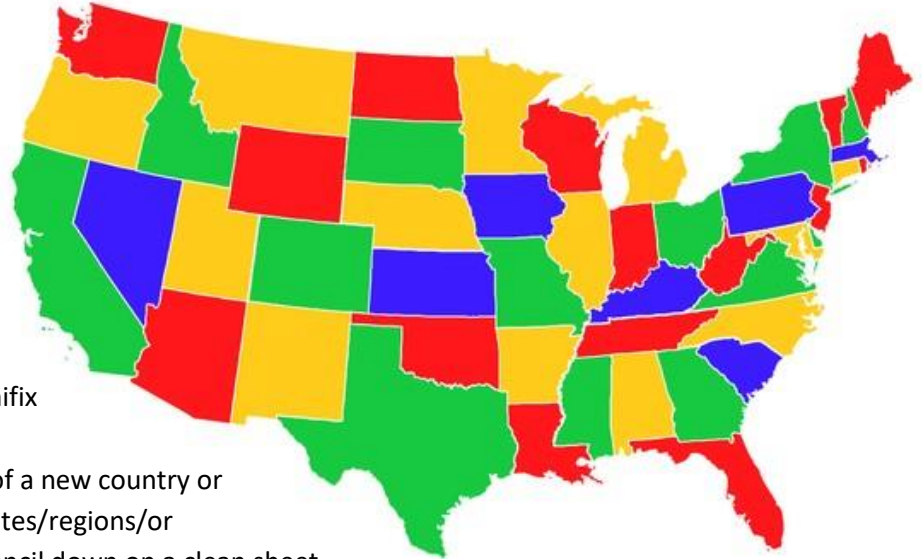
1. Blow up an outline of the continent you wish students to map on a copy machine. Expand the outline as large as possible, ex. so that it nearly fills a paper of 11 inches by 17 inches.
2. Have students prepare ahead of time flags on toothpicks of important regions, geographical features, etc they want to include on their continents. Flags will be pushed into soft dough.
3. Secure the paper to the front of the foam core board with tape.
4. Trace the outline of the state, country or continent with a sharp pencil or a toothpick. This will leave an indentation in the foam core board. Press into the paper as if you are writing a letter, without puncturing the paper.
5. Remove the paper from the board to reveal the silhouetted indentation.
6. Paint or color around the outline on the board. Use blue paint to represent water or green and brown paint to represent vegetation-covered land. Mix in some yellow or white paint to make the details appear more accurate. Wait for the paint to dry overnight.

7. Roll a layer of green or brown modeling clay out to a thickness of 1/4 inch.
8. Lay the modeling clay over the entire area of the outline and press it into the board to secure.
9. Mold clay to fit into the indentations of the outlined image, using your fingers to gently move the clay. Fill the entire map area with clay. This is the workspace on which you will build the relief portion of the map.
10. Roll blue clay into a sausage shape on a flat surface to build a river or the ocean on the coast. Knead and roll the clay with the palms of your hands. Press into position, pinching the edges and making indentations with your fingers to model waves and ripples of the water.
11. Pinch small pieces of white clay into the blue clay to simulate whitewater.
12. Roll balls of green and brown clay and shape them into mountains. Push each ball into a cone shape by pressing it down on a flat surface while applying more pressure to the opposite end.
13. Press each clay cone into the base clay. With your fingertips, smudge the bottom of each cone into the base clay to secure the mountains into place.
14. For the tallest mountain ranges, ex. Himalayas, pinch a bit of white clay between your fingers and lay it on top of each mountain shape. With your fingertips, gently smudge the outer edges of the white into the green and brown mountains to represent snow.
15. Have them use different colors to show a a geologic fault line, such as the San Andreas or New Madrid faults.
16. Press green and yellow clay through a sieve to make small strands of clay. Cut them with scissors and drop them onto the map to represent grasslands and prairies.
17. Yellow or light brown clay can be used for deserts with hills and dips molded in for the dunes.
18. Roll out thin snakes of green clay. Coil them onto the clay base to form trees in forested areas. Make as many trees as you need to cover the entire forest area on the map.
19. Press the fork, knife and spoon into the clay to build hills and valleys and to develop textural elements.
20. Press rice, dried beans, cotton and dried grass into the clay on the board. Allow the items to dry in the clay, or remove them to leave an interesting textural effect that simulates the look of each landform.
21. Place the map in an undisturbed spot and allow the clay to dry for at least 24 hours, according to the manufacturer's recommendations. Allow for sufficient drying time. The dough will not adhere to the board if it is not permitted to dry.

# The Mathematics behind the Maps: The Four Color Theorem

## Materials

- Pencil, paper and coloring tools
- String
- Two or more [preferably four if you can find them] colors of marking pieces, such as squares of construction paper, unifix cubes, or poker chips



1. Have students draw a map of a new country or continent (with different states/regions/or counties) by putting their pencil down on a clean sheet of paper and drawing a long curving line that goes anywhere on the page. The pencil cannot stop or be lifted off the page until it meets the point at which it started. The pencil line can cross itself any number of times and at any point.

Challenge the students to color the map using the fewest colors possible with these two rules:

- Regions that only touch at a vertex or point may be the same color.
  - Regions that share a side (or portion of a side) **must** be different colors.
2. Have the students work together and experiment with coloring the maps that they have made. [Note: They should all be two-colorable.] If they find one that is not, check it together very carefully to see that it has been made properly. Be sure that students understand that drawing a map that is so complex it is hard to verify whether it can be two-colored or not is not the same as drawing a map that *cannot* be two-colored.
  3. Then, have students use a large loop of string to create maps and color them. Option: Instead of coloring the regions, students can use colored marking pieces to mark the colors that they would use.)
  4. Then, have students try to twist and cross the loop of string so that the resulting "map" will not be two-colorable. What is the relationship between the loop of string and the way that the students originally drew maps on their paper?
  5. Have students do the same thing using *two* loops of string, and allow the loops to overlap in any way that they like.

## Discussion

1. They can't make a map that isn't two colorable! (But why?) Discuss what happens at each step and why the map remains two colorable.

2. Invite the students to talk about what it means to be certain of something. What is the difference between *doubting* that something is true and *knowing* it is false?
3. What makes them certain that they can always make a map that they can color with two colors using this method? What makes them not so sure that this will always work?
4. At the foundation of this activity is the mathematic proof technique called induction. The idea behind induction is to begin with the simplest possible case (the closed loop that forms a circle) and build up incrementally to more and more complex cases. If you can explain why every "map" that you build up from that simple loop of string is always 2-colorable, then you have completed your proof.

## The State of Maps Today

Now that they've tested a few maps, how many different colors do students think you need to have available if you want to color a map so that countries or states that share a boundary line are not colored the same color? A deceptively simple mathematical problem lurks within the brightly colored patchwork of states in the United States. It's the sort of problem that might worry frugal mapmakers, or teachers, who insist on painting their maps with as few colors as possible.

Give students the blank printout of the United States. Have them color the states with as **few** colors as possible, using the same rules that applied to their earlier maps.

- Regions that only touch at a vertex or point may be the same color.
- Regions that share a side (or portion of a side) must be different colors.

Are four colors always enough to fill in every conceivable map that can be drawn on a flat piece of paper so that no countries, states, or regions sharing a common boundary are the same color? For a very large map (like the map of the US states students just did), it would literally take the fastest computers imaginable thousands, if not millions of years to check out all the possibilities!

Francis Guthrie, a 21-year-old mathematics student at University College in London, was mapping the counties of England in 1852 when he noticed that he only needed four colors for the map. He asked his younger brother, Frederick Guthrie, if this was true for any map. Frederick took the problem to his professor, Augustus de Morgan.

### FYI

In the language of Mathematical Map Coloring, a map is not much different from the maps in your atlas. The areas which would be countries, states, counties, etc., on a political map are called regions. The lines that separate one region from another are called boundaries. Every region in a map is a closed curve because if it wasn't, the colors would leak out of the lines.

When a map is colored, the number of colors used and their arrangement relative to one another is called a coloring of that map. A coloring that uses two colors is called a 2-coloring; if it uses 3 colors, it is called a 3-coloring, and so forth. Following the same pattern, a map that can be colored with two colors is called two-colorable. A short-cut way mathematicians use of expressing this is by using the variable  $n$ , and saying that a map that is  $n$ -colorable is a map that can be colored with  $n$  colors. The number that you will use to replace the  $n$ , will, of course depend on the map you have colored and how you have colored it.

In 1878 Arthur Cayley presented this problem to the London Mathematical Society. He and various others tried to prove it over the next century. In 1976 Wolfgang Haker and Kenneth Appel of the University of Illinois proved the theorem using a computer. It took them four years to simply write the computer program for the Cray computer, which took 1,200 hours to check 1476 configurations. Some mathematicians are troubled by the proof by computer. They feel that a theorem so easy to understand should be able to be proved by hand. Anyone who can prove the theorem without the computer may win the Fields Medal, the math equivalent of the Nobel Peace Prize

## Notes on Mathematic Map Coloring Strategies

During this project students will typically discover a variety of interesting strategies for finding a coloring of a map that uses a small number of colors on their own. Some of these are described below. It is important to give them a chance to discover these techniques on their own and then talk about what it is they're doing and how these strategies can be applied in other areas of mathematics [all of this relates to graph theory, planes, vertices, etc] and other subjects.

### The Polka Dot Strategy: A Greedy Algorithm

One of the strategies they may discover is the *Polka Dot Strategy* [also known as a Greedy Algorithm] of using one color to exhaustion before taking up another one.

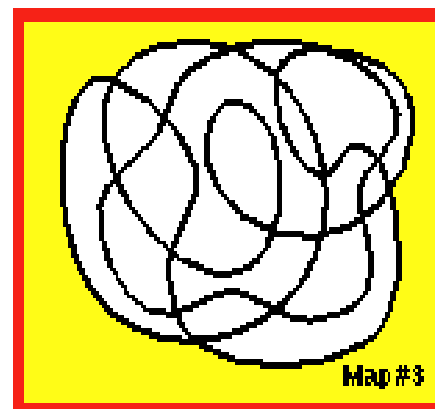
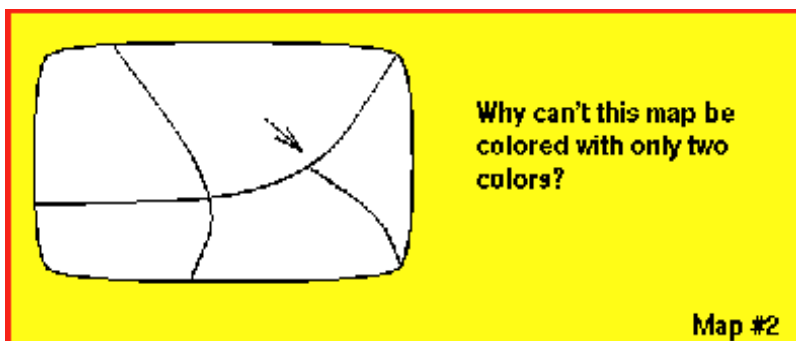
Greedy Algorithms are one of the most basic and general algorithm strategies used in math. An algorithm is a step-by-step recipe for solving a problem. A greedy algorithm might also be called an algorithm that gobbles up all of its favorites first. The idea behind a greedy algorithm is to perform a

single procedure or step over and over again until it can't be done any more and see what kind of results you get. It may not completely solve the problem, or, if it produces a solution, it may not be the very best one, but it is one way of approaching the problem and sometimes yields very good (or even the best possible) results.

Some children will be able to explain why Map #2 cannot be colored with two colors. At the juncture indicated, three regions meet, each of which borders the other two, so they must all have different colors. Such an explanation is a deduction, part of the idea of proof, which is at the heart of mathematics. Surprisingly, Map #3 can be colored with two colors.

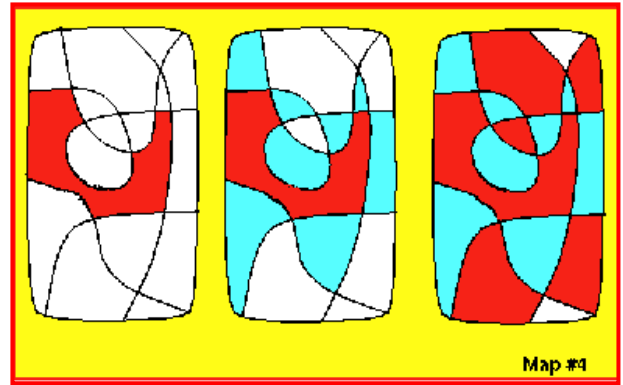
### Chain of Logical Deductions

Some children may discover a method for finding a 2-coloring (if the map can be 2-colored) by following a "chain of logical deductions" ex. in Map #4. In the leftmost map, one region has been colored *red* . If





only red and blue are the only colors you want to use to color the map, all of the regions which border the red must be colored *blue*. In turn, the regions bordering the blue must all be colored *red*. As we continue, we will either succeed in 2-coloring the entire map, or get stuck. If we get stuck, we know that a 2-coloring is impossible, since we only did what we were logically forced to do up to that point.

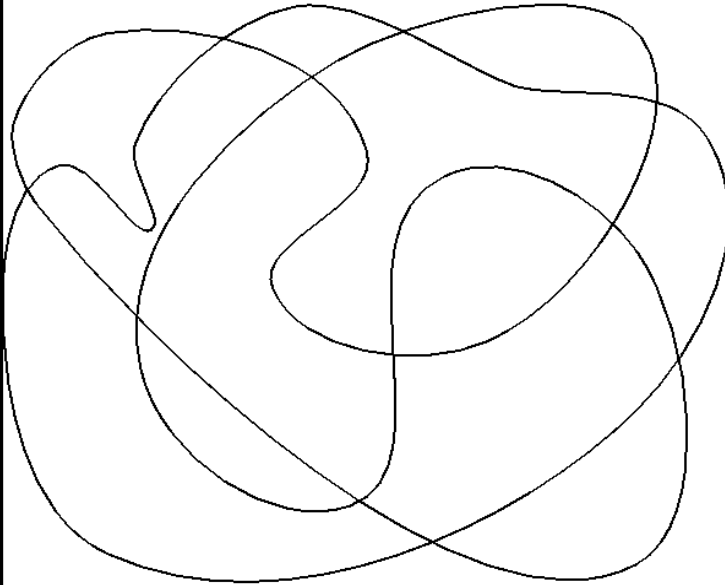


## Movable Pieces

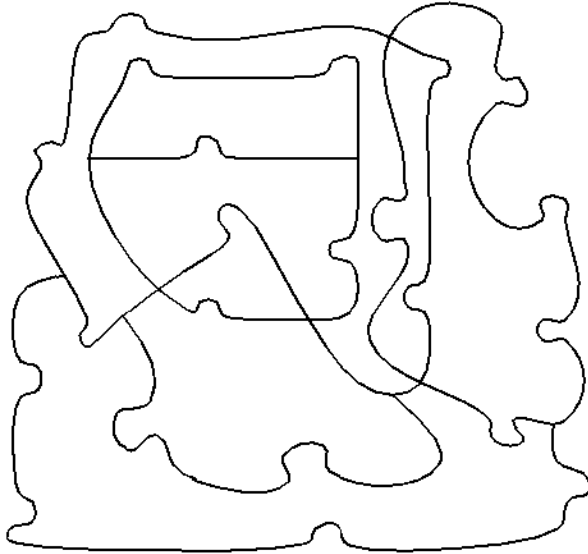
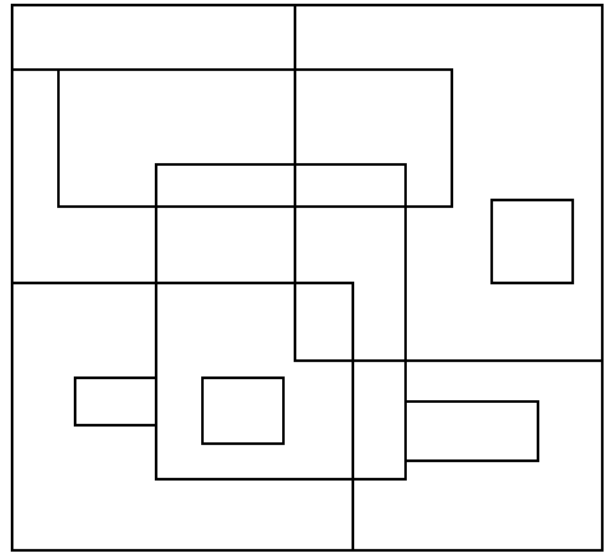
Have students work with colored marking pieces, ex. poker chips, to represent the colors assigned to the regions rather than coloring and coloring for more complex maps, ex. The US States Map. Using poker chips, is a way of using and showing the concept of a *variable*, something you can change. The region is the *variable* that is assigned the *value*, which in this case is a color.



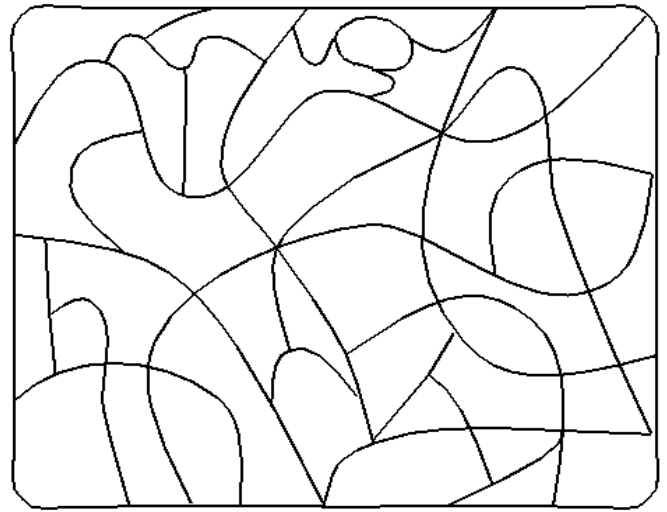
Swirltown



Boxville



Bumpington



Popdale



## The Lands We Wander...

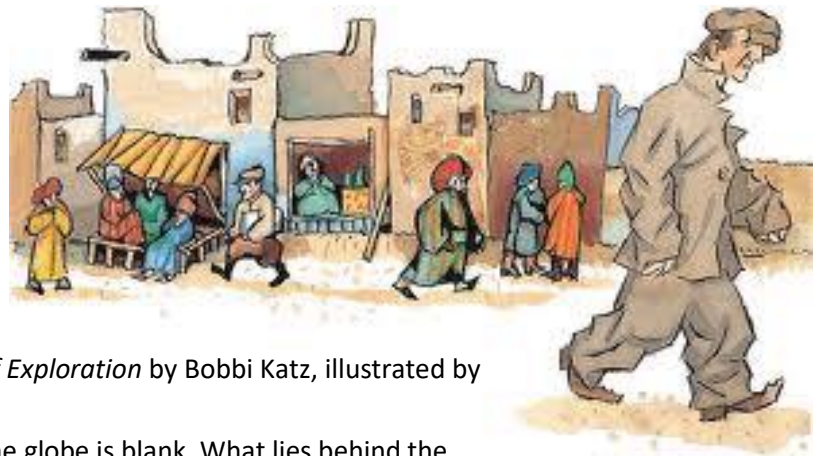
There are many many excellent books to introduce this section and the following project such as *How I Learned Geography* by Uri Shulevitz or *Follow that Map* by Scot

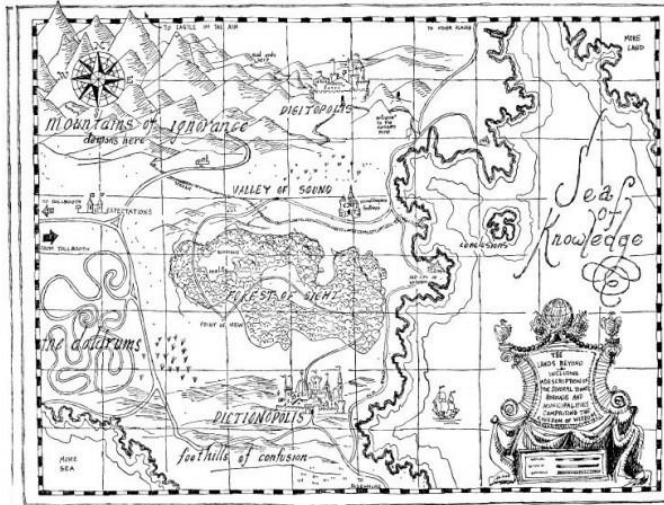
Ritchie, or the fascinating *Trailblazers: Poems of Exploration* by Bobbi Katz, illustrated by Carin Berger (Greenwillow).

“Imagine an earlier time...there are no maps. The globe is blank. What lies behind the mountain, beyond the sea, beyond earth's atmosphere? Who will risk life itself to find out?” Maps are about far more than getting from point A to Z and they have come in a variety of forms throughout history. Maps are used by everyone from geographers to travelers to hikers to airline pilots. There are treasure maps, maps to the human genome, patchwork quilt maps held a series of hidden clues that guided slaves [following secret signs sewn into the quilt patterns] along the Underground Railroad to Canada. People have been making maps for over 4,000 years, and they've come a long way. We used to rely on explorers to visit faraway places before a map could be made. We still have explorers that travel the Earth (and beyond) to discover and map new places, but now we can also make and update maps with information sent from satellites in space. Even our favorite tool for getting her to there, GPS, is all based on maps.

The science and art of mapmaking is called cartography. From cave paintings and ancient European maps to new maps of the 21st century, people have created and used maps to help define, explain, and navigate their way across the planet and beyond. No matter what content is shown by maps, they can transport us places far away or help us explore the areas near our homes.

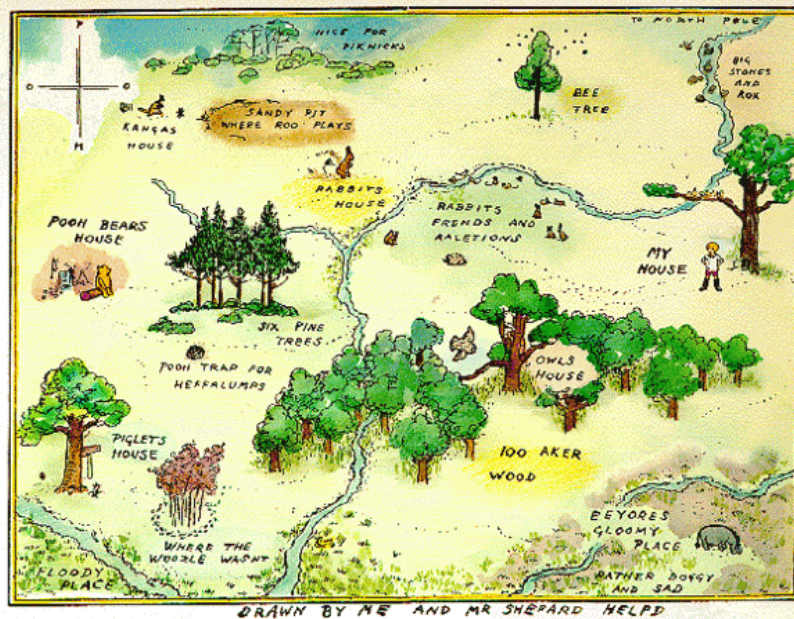
Maps can help children understand and explore both their everyday environment and faraway places, even ones that only exist in the mind of their creator. Stories do a great job of getting your imagination to wander, they depict great mythical lands that pour out life, and bring imaginable lands to existence, but it's maps that actually make them real locations. A good map makes kids feel as if they can actually venture to that land one day. Some excellent examples of imagination and maps are often shown in literature, in books like *The Phantom Tollbooth*.





The map from *The Phantom Tollbooth* is a perfect example of where hand-drawn aesthetics work best in maps—across a small area mapped specifically for visitors, as the exaggerated landmarks are given weight over exacting spatial accuracy. In this way the unfamiliar can be easily spotted and identified. It's a style commonly seen in attraction maps, like Anika Mottershaw's Map of London or theme-park maps, like those of Walt Disney World, <http://disneyworld.disney.go.com/maps/>.

A.A. Milne's *Winnie the Pooh*,



The key difference between a map like this one and the one from *The Phantom Tollbooth* is purpose. While Feiffer's map is intended for exploration, Christopher Robin-E.H. Shepard's map is a documentation of a known land. In an imaginary world, what's beyond the borders doesn't matter so much. Here the only indication of the world beyond is the "To North Pole" note, an obvious sort of landmark for a child's map. A map of an imaginary world is not unlike early maps, such as Hecataeus' map of the world, drawn in approximately 500 BC, with its amorphous borders of "ocean." Both Hecataeus and Christopher Robin are making the same point—sure there's probably other stuff, but this is what's really important.

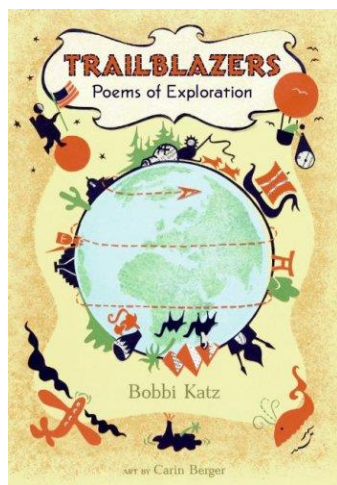
Other fine examples are found in *The Chronicles of Narnia* by C.S. Lewis, *Earthsea* by Ursula K. LeGuin, *The Hobbit* [Drawn more or less to scale, Tolkien's maps show locations in relation to each other with only sparse detail—only what you absolutely need to know to get where you're going, no hints of what else is out there. Only the information you require, all of the in-betweens omitted. **Discuss with students, when else do we use maps like this?** Possible answer: It's the sort of map you might draw on a napkin for a friend from out of town who isn't sure where she's going. Maps are also found in *The Princess Bride*, and L. Frank Baum's *The Wizard of Oz* [a great example of a political map—it's easy to imagine it as a pull-down over the chalkboards of Oz classrooms]—all of which feature engaging maps that serve as gateways to imaginary lands. These maps say YOU ARE HERE, in another world. Now, while many authors draw many maps, *The Hobbit* contains many, many maps and all told, Baum drew forty individual maps of Oz to accompany his novel, some books don't include maps, and it would be quite helpful if they did. **Discuss with students the purposes of maps in books.** Possible answers: Maps help readers remember people, events, and locations, etc.

So what do some readers do when they wish they had a map? For example, a notable map omission from recent literature: *The Hunger Games* didn't include a map of Panem! **Ask students, what's a map desiring reader to do when there isn't one?** Create one themselves. Assortments of reader-drawn maps have popped up related to *The Hunger Games*. One of the best belongs to Livejournal user "aimmyarrowshigh," who describes the process she used to determine national borders and each district's location. The result is a spectacular map that would make any cartographer proud. Go to the following link to show students the final result, <http://img8.imageshack.us/img8/4070/panemmap.png> and here to read about her process, <http://aimmyarrowshigh.livejournal.com/32461.html>.

## Creation of a Continent

Inspired by a project by Diane Fitzgerald, All Rights Reserved.

[http://teachers.bvsd.org/diane\\_fitzgerald/library/new%20continent%20project.pdf](http://teachers.bvsd.org/diane_fitzgerald/library/new%20continent%20project.pdf). 19 April 2012.

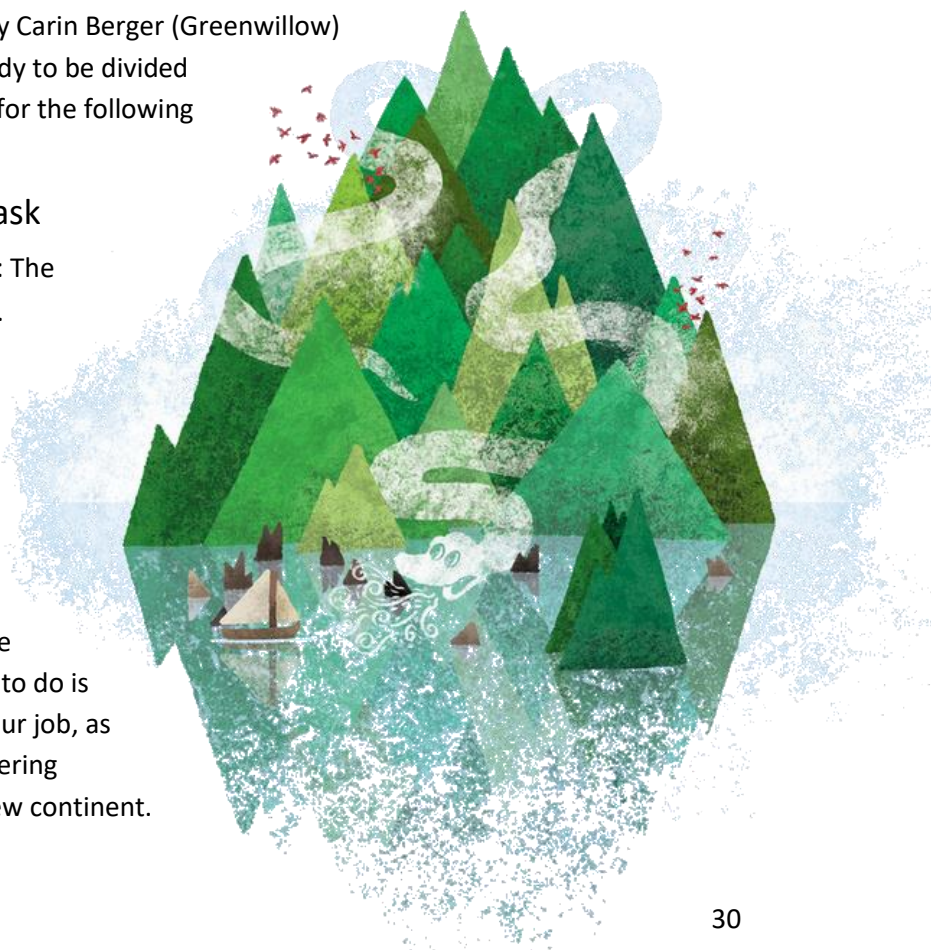


Once students have seen and discussed multiple examples of imaginary maps [a large image gallery of fantasy maps is available at <http://www.woodge.com/books/fmaps.html>] and explored related literature, such as *Trailblazers: Poems of Exploration* by Bobbi Katz, illustrated by Carin Berger (Greenwillow) they are ready to be divided into groups for the following project.

### Sample Task

Narrative: The year is 2050.

Terra-forming and new advances in geo-engineering have made it possible to drastically change the face of the earth for the better. In particular, human beings have decided to solve the problem of limited land by raising a new continent in the middle of the ocean! We already have 7 continents, and they are great. But what you have the opportunity to do is to create something truly spectacular!! Your job, as leader of the world's foremost geo-engineering corporation, is to design and create this new continent.



Your board of directors and the United Nations has given you almost unlimited leeway in this project. You may make the continent wherever you wish, in whatever shape you wish, as long as you allow settlers from the other continents to settle there. Will it have islands? Snowy mountains? Huge rivers? Jungles? Vast deserts? That is up to you. You also have complete control over politics in the new continent. You may decide to allow several different countries to occupy your land, or you may create one enormous empire. You may allow a dictatorship, a democracy, even a monarchy. It's up to you. Remember that your new land will be inhabited by refugees from the other continents, but whole new cultures and languages may arise, too.

**Variations:** Instead of a new continent, have students create an imaginary map for one of their favorite books or ask them, "Imagine an earlier time...there are no maps. The globe is blank. What lies behind the mountain, beyond the sea, beyond earth's atmosphere? Who will risk life itself to find out?" and have them re-imagine our globe.

**Image Credit: Mysterious Island** by David Creighton-Pester.  
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[http://society6.com/product/Mysterious-Island\\_Print](http://society6.com/product/Mysterious-Island_Print) Accessed 4/20/12.

### The Point:

The point of this project is to demonstrate students' knowledge of:

- Types of maps
- Elements of a map
- Logical placement of landforms
- Use of graphs, diagrams, and tables
- Types of political and economic systems
- Application of the five themes of geography

**For this project:** Students must create a display with the following things:

Two Maps:.

1. A physical map, labeled with at least 15 major landforms/bodies of water (plains, seas, mountains). They must be logically placed.
2. A political map, showing the countries and capital cities on their continent, color coded.
3. A model of the continent, ex. made from clay, with a topo map of their continent. [They may later be assigned to give their topo map to another group, and that other group will try to recreate their continent using clay or other materials.]



**Tip to give students:** To save yourself time, create one outline map and copy it, so you don't have to do everything repeatedly, physical, political, and topographical maps can all be based on the same outline. If possible, it is a good idea to make a photocopy of each map or use carbon paper to make multiple copies. The original map should be left as untouched as possible while the photocopy is a working copy that may be cut up if necessary.

**Note:** Each map should have a legend, a compass rose, and a scale indicator.

Also have students include, one graph, diagram, or table in their project. Students can compare population of the major cities, or how population will grow over time, or show which countries have the largest population. They could show percentage of land used for different purposes like mining, farming, or grazing. They could also show the various elevation differences on the continent. They can choose whatever format fits their purpose – bar graph, circle graph, line graph, or table.

Students will need to create a written narrative, describing their continent using the following five themes of geography. Discuss the following five elements with students.

1. **Location.** Give your continent's latitude and longitude (absolute location) and its relative location. What other continents is it near? What ocean is it in, and part of the world? Ex. Concordia's absolute location is 40°N, 40°W, in the middle of the Atlantic Ocean. It is exactly halfway between North America and Europe, and south of Greenland. (relative location)
2. **Place.** This includes both human and physical (natural) characteristics. What is the land like? What is the climate? What is the shape of the land and what are the major types of vegetation? Is it urban or rural? What are the man-made features of this place? Any famous landmarks?
3. **Human-environment interaction.** This includes how people depend, adapt and modify (change) the environment. How do people use the land or protect the land here? Do they mine, or farm? Have you built dams, or planted forests? Are there any environmental problems to solve?
4. **Movement.** How do people, goods and services and ideas move from one place to another? Do people come and go here, or is it isolated from the outside world? Where do most of your immigrants come from? Do people migrate from one region to another? What are your trade routes between towns and countries? Are there roads, railroads, airports, or some other form of transportation? How do people get where they need to go?
5. **Region.** Describe the formal and functional regions in your continent. Describe the vernacular. What languages are spoken there? Are there other names for different regions? Do particular cultures tend to congregate in certain areas? Are there particular areas that are dedicated to one industry, like farming or fishing? Is the continent divided into countries, or states? Are there major rivers or bays that tie certain areas together?

**Extension:** You may also assign students to create a flag, money, and postage stamps. When they're done researching, have students create a travel brochure with hand-drawn pictures and any details a tourist might want to know before visiting. (Have samples of real brochures for students to use as a guide.)



# ***CREATE YOUR OWN COUNTRY***

*Country Name*

*Size*

*Population (number of people who live there)*

*Language(s) spoken*

*Favorite sport(s)*

*Seasons and weather*

*Food(s) the country is famous for*

*Popular pastimes*

*Famous tourist attractions*

*Modes of transportation (or how they get around)*

*Popular pets*

*Types of wild animals*

*Common jobs*

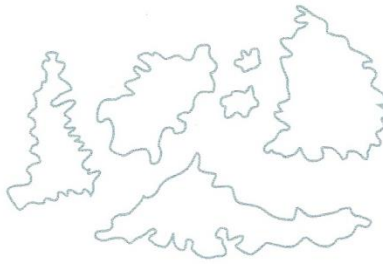


QUICK REFERENCE	
SKILL LEVEL	6 yrs +
EQUIPMENT	THIN BLACK PEN, BLUE AND GREEN COLOURED PENCILS
TIME	1 hour

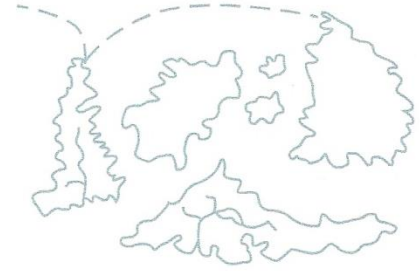
SPECIMEN No. <b>72</b>	Title: <i>draw your own Antique Map</i>
Name / Name: <b>Kaptin Scarlet</b>	
Date: <b>Oct 15th 1897</b>	
Code: <b>exp: 25-/004</b>	



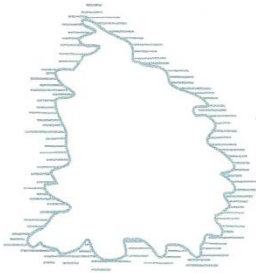
1. PRINT OUT THE BLANK MAP TEMPLATE. CAREFULLY CUT IT OUT TO REMOVE THE WHITE EDGE IF YOU WANT



2. DESIGN AND DRAW YOUR ISLANDS OR COUNTRY. USE A WIGGLY LINE AND MAKE LOTS OF LITTLE ISLANDS NEAR THE MAIN ONE. REMEMBER TO DRAW COVES, BAYS AND RIVER INLETS



3. DRAW IN THE RIVERS AND SEA ROUTES LINKING SOME OF THE SMALLER ISLANDS WITH THE MAIN ONE. USE A DASHED LINE FOR THE SEA ROUTES



4. AROUND THE EDGE OF EACH PIECE OF LAND DRAW SHORT STRAIGHT HORIZONTAL LINES, ALSO FILL IN ANY LAKES WITH THE SAME HORIZONTAL LINES

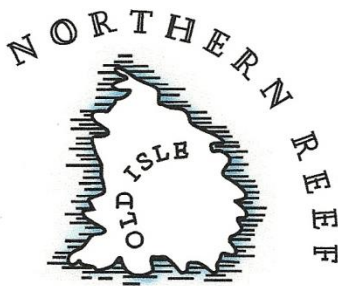
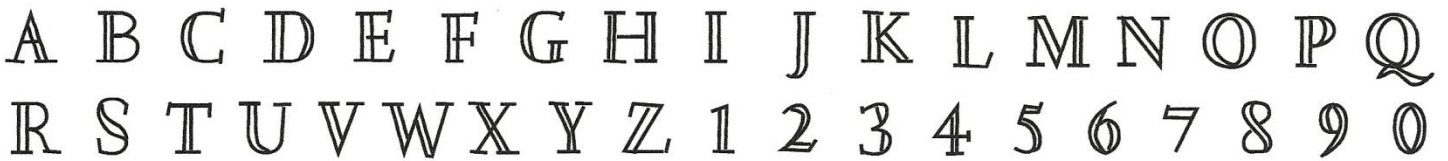


5. MARK IN YOUR MAIN CITIES AND TOWNS EITHER DRAW SHAPES FOR THE CITIES OR LITTLE PICTURES OF GROUPS OF HOUSES, ADD THE ODD SPIRE OR CASTLE, JOIN THE TOWNS WITH ROADS. NAME YOUR TOWNS, ROADS AND RIVERS. BE CREATIVE WHEN NAMING THEM

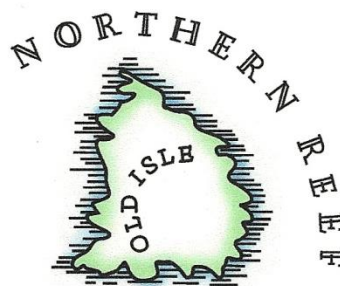


6. NAME YOUR ISLANDS AND THE SEAS WITH NAMES WRITTEN NEATLY IN CAPITALS USING THE GUIDE BELOW OR FLOWING COPPERPLATE SCRIPT. FOR THE BEST EFFECT SPACE OUT YOUR LETTERS TO COVER THE AREA THE NAME REFERS TO, JUST LIKE A REAL MAP

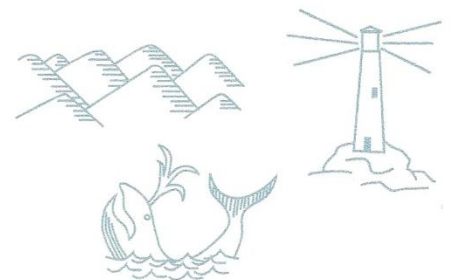
LETTERING GUIDE (NOTE WHERE THE THICK AND THIN STROKES ARE)



7. COLOUR ROUND THE EDGE OF EACH PIECE OF LAND WITH BLUE COLOURED PENCIL

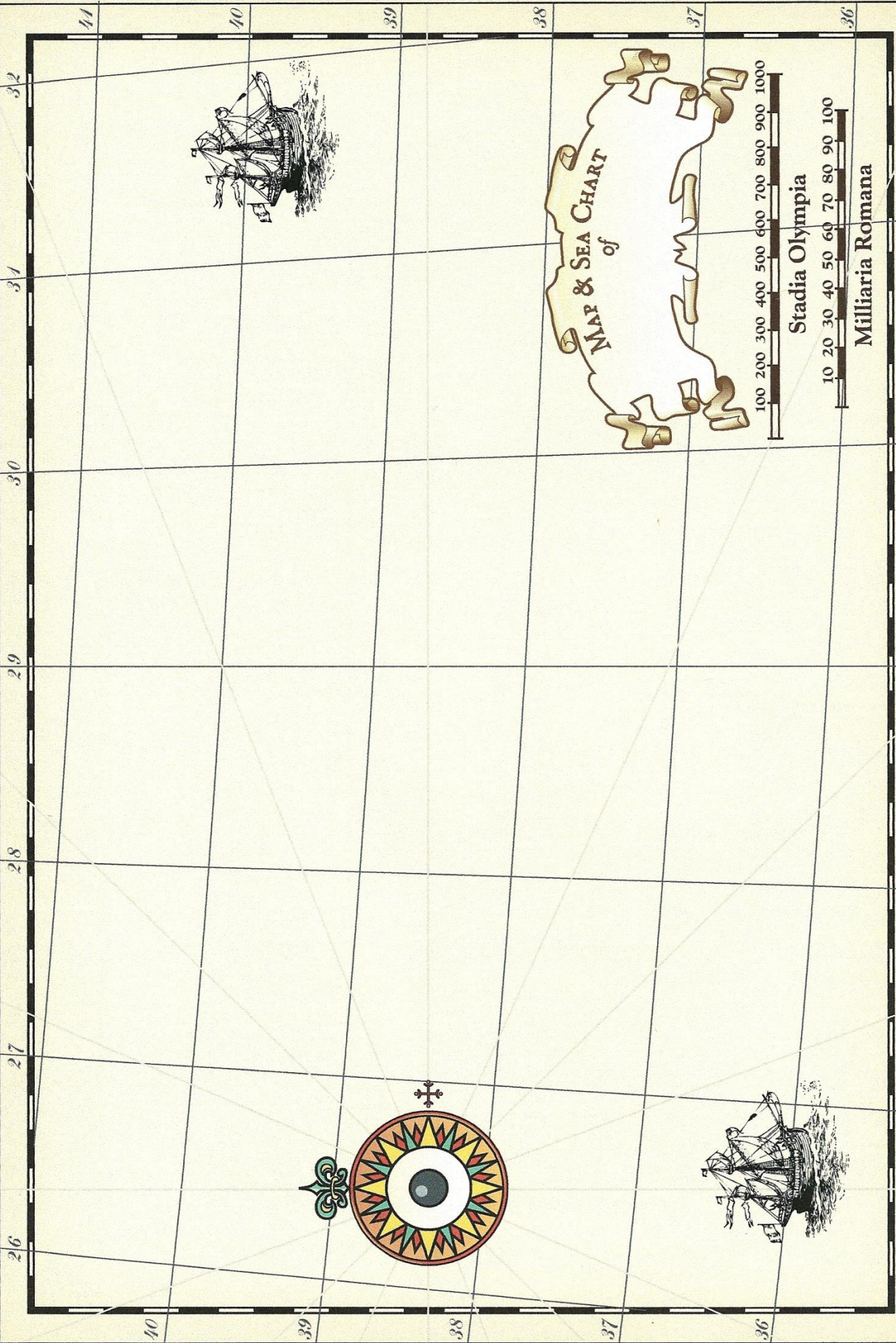


8. COLOUR INSIDE EACH PIECE OF LAND WITH GREEN COLOURED PENCIL COLOUR SMALL ISLANDS IN COMPLETELY



9. DRAW SOME MONSTERS IN THE SEA AND ON THE LAND. DRAW IN CAVES, MOUNTAINS AND ANY OTHER FEATURES THAT YOU THINK WILL BE OF INTEREST TO TRAVELLERS VISITING THE ISLAND YOU DISCOVERED AND CHARTED





MAP & SEA CHART  
of

Stadia Olympia

Milliarum Romana

100 200 300 400 500 600 700 800 900 1000

10 20 30 40 50 60 70 80 90 100

PUBLISHED IN LONDON BY ALEXANDER & CO. 1849

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## Globe Game



Make a game out of geography with this activity. Arrange students into groups of four. Provide each group with a globe or a detailed map.

(That map might be a map of your town or state, the country, or the world -- depending on the focus of the curriculum at your grade level.) Have students in each group select a location on the map, ex. students will select a city, continent, geographical feature, or country on a world map.

After students have selected a location, start with the first team. That team fields yes or no questions from the other teams, one question at a time. (Team 2 asks a question first, then Team 3, 4) The questions might start out general and get more specific. You or a specified game leader monitors the questions asked to make sure they are fair questions. For example, if students are working with world maps, questions might include:

- Is the place on the continent of Africa?
- Is the place north of the equator?
- Is the place east of Mali?
- Is part of the country located between 10 and 20 degrees South latitude?
- Does the place begin with the letter *B*?

As questions are asked, team members refer to their maps and agree on a response. If they give a "Yes" answer, the team that asked the question can choose to make a guess as to the name of the specific place. If the team guesses correctly, they earn five points. If the guess is incorrect, the next team asks a question that will help identify the place.

After Team 1's place is guessed, it is Team 2's turn to answer questions about the place it selected; Team 3 begins the questioning.

### More Game Suggestions

- When it is a team's turn to ask a question, 1) students on each team might work together to create questions and give responses, or 2) one student at a time might ask a question. If the latter is the case, students on each team need to establish a sequence of players within their team, so each player asks one question before any player asks a second question.
- Each team should have some kind of barrier/wall/carrel so they can get close to their map or globe without opposing team members being able to see which area of the map/globe they are looking at; that is especially important as questions get more specific.

## Showers of Knowledge

For any activity where students have to memorize locations, (continents and oceans, states and capitals in a region, South American countries and capitals) it works well to make a shower curtain game. Make an overhead of the map, and then trace it onto one or two clear or white shower curtains. Color it (optional) and make cards that are to be placed onto the large "game board." The included lesson cards are the names of the continents and oceans in the case of the continents and ocean map.

Then give students a blank map, have them make their own cards (smaller) by cutting up index cards and putting them in an envelope. They then get a miniature version that is correctly labeled as the key. They can take this game home to study.

Play the "game" as a whole class. Each team places the cards onto the map. Each team member gets a turn practicing, and then time them the second time around to see which team can correctly.

## Put Your Class on the Map

kids around the world picture source:

<http://franciscojennifer.pbworks.com/w/page/29133212/FrontPage>

Help your kids figure out their place in the world with a map that showcases your class' interests and adventures.

Hang a world map on a large bulletin board or spray-mount it on foam core. Decide on the categories you want to include: locations of relatives, places you've been or want to go to, the countries where your clothes came from (check the labels), and so on. Then create a legend by listing the categories on a sheet of paper and assigning each one a different-color pin. Have students arrange the pins on the map and tack up related materials, such as notes, ticket stubs, clothing tags, stamps, and photographs.



## Continent Survivor

This is a question continents quiz designed to be played as the quizzes are done in Survivor. The students should all start at the back of the class. As each question is asked, each student chooses the continent they think is the answer. They hold up their answer, and the ones who have it correct move forward.

You either need to supply each student with a chalkboard or pieces of paper to write their answers on, or you can give each one 7 pieces of paper with the names of the continents and they hold up the correct answer. Questions should vary in difficulty as you want every child to be able to move forward at least once, but you also don't want them all 'winning'. You can make up your own questions or use the following. These questions are especially suitable for upper elementary and middle school students.

For the purposes of this game, it is assumed there are 7 continents, and the smallest has been called 'Australia', which is also sometimes referred to as Oceania. Please accept that as the answer to all 'Australia' questions if that is what you have taught your class.

Each child needs a way to display their answer. They should either each have 7 large pieces of card / paper with the names of the continents on them, or they should have a chalk board or a stack of paper so they can write down their answers.

Take your class somewhere where they can progress from the 'top' to the 'bottom' or from the 'front' to the 'back'. Starting them all off on the top row of the bleachers would be perfect. If that is not possible, you can even have them all go to the back of the classroom and you can put tape on the floor to indicate the 'row' they have to move to as they move forward.

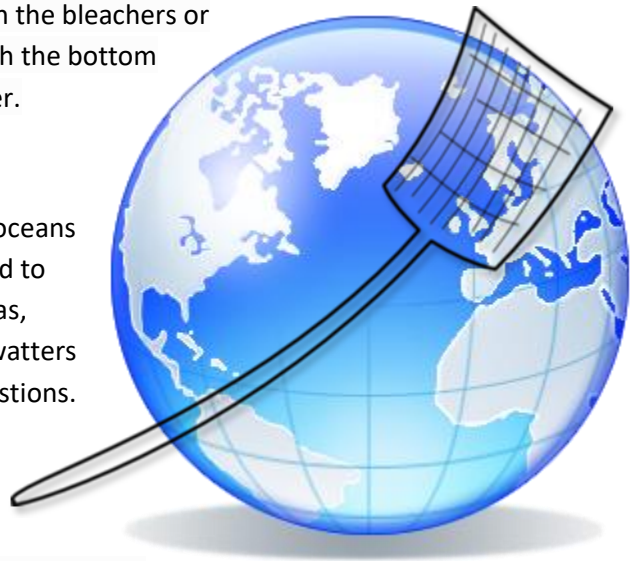
Read out the first question. Each student must find the correct continent card(s) or write their answer down. Give them a few seconds, and then call out 'Display'. All the students must hold up their answers. If they are correct, the student may move one row down on the bleachers or one row forward in the classroom. The first student to reach the bottom of the bleachers, or the front of the classroom, is the winner.

## Variation: Mapamoscas

The shower curtain "game board" or a large display of the oceans and continents and the following questions can also be used to play Mapamoscas a.k.a. a Geography version of Matamoscas, where the students are in two teams, and race to use fly swatters to slap the correct continent when asked the following questions.

### Questions

1. Which continent is also an island? **Australia/Oceania**
2. Which continent is classified as a desert? **Antarctica**
3. All seven continents could fit over which ocean, still leaving room for another Asia? **Pacific Ocean**
4. Which continent is the most populated? **Asia**
5. Which ocean is surrounded by the Ring of Fire, a large number of active volcanoes? **Pacific Ocean**
6. Which continent is the largest in area? **Asia**
7. Which continent contains the most countries? **Africa**
8. Which is the smallest continent? **Australia/Oceania**
9. On which continent will you find the world's highest mountain? **Africa**
10. Which continent borders Asia? **Europe**
11. Which continent is bordered by the Indian Ocean on the east and the Atlantic Ocean on the west? **Africa**
12. Which continents lie entirely within the southern hemisphere? **Australia and Antarctica**
13. Which is the only continent with no desert? **Europe**
14. The Panama canal separates which 2 continents? **North America and South America**



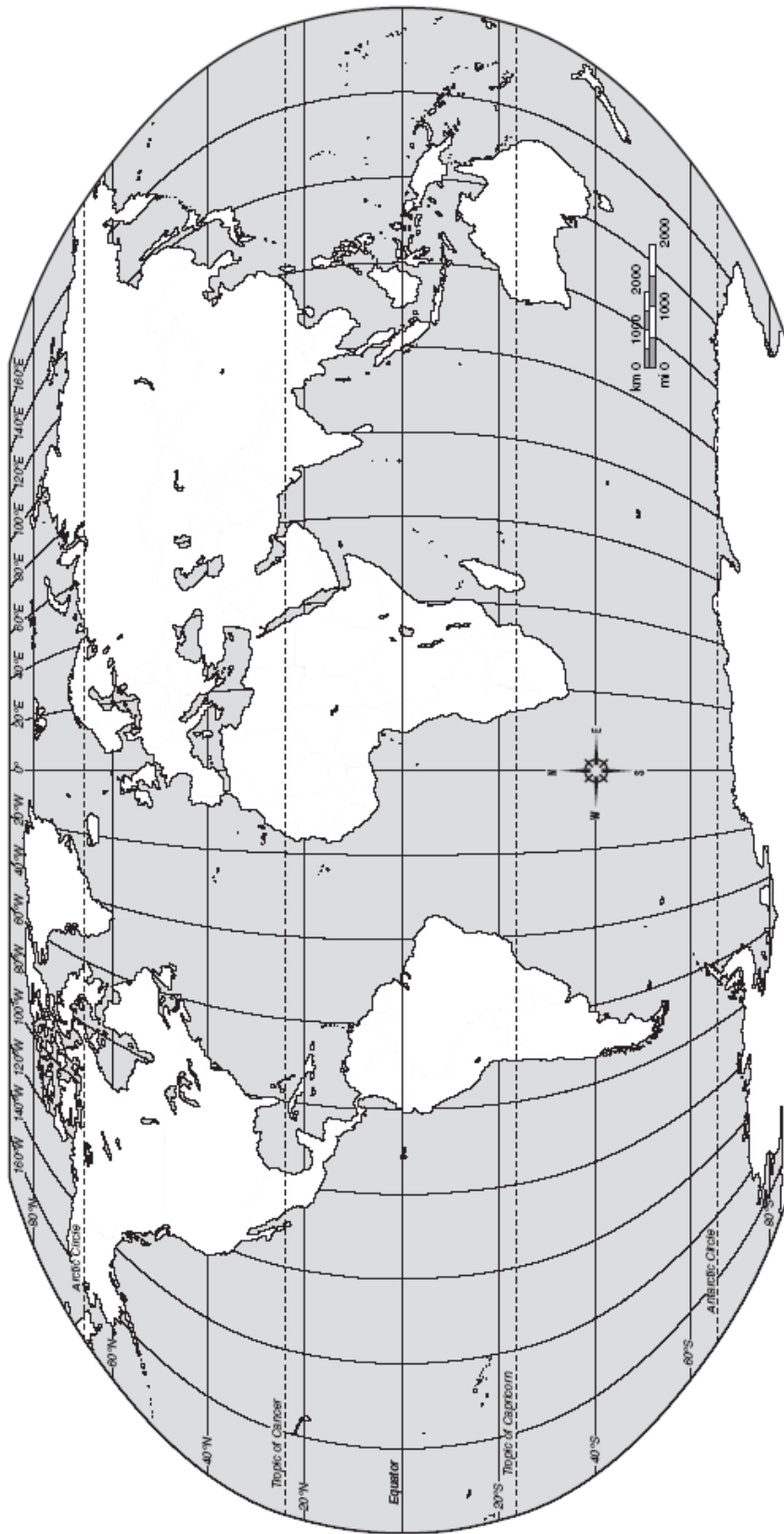
15. Which continent is located south of Europe? **Africa**
16. The Mariana Trench, the deepest known area of Earth's oceans, having a deepest point of around 11000 metres (36000 feet) is located in what ocean? **Pacific Ocean**
17. On which continent will you find Mexico? **North America**
18. On which continent will you find the highest waterfalls in the world? **South America**
19. The Middle East is part of which continent? **Asia**
20. Which ocean is the third largest ocean on Earth, covering around 14% of the Earth's surface?  
**Indian Ocean**
21. Madagascar is an island off the east coast of which continent? **Africa**
22. Which ocean is so deep that in some places more than *100 Statues of Liberty* could be stacked on top of one another and they would still be underwater? **Pacific Ocean**
23. Which continent contains the world's longest river (The Nile)? **Africa**
24. Which continent contains more countries than any other continent (53 countries)? **Africa**
25. Guide planes and ice-breaking ships have to travel with the trade ships sailing on which ocean?  
**Arctic Ocean**
26. Can they name the continents by order of most countries to least? Asia: 47 countries, Europe: 43 countries, North America: 23 countries [including all the islands], Australia/Oceania: 14 countries, South America: 12 countries, Antarctica: 0 countries
27. The Amazon River is found on which continent? **South America**
28. Humans have only explored about 3 percent of what? **The oceans**
29. The Mediterranean forms the northern border of which continent? **Africa**
30. Which ocean is bordered by Australia to the east, Asia, to the north, and Africa to the west? **Indian Ocean**
31. Which continent is famous for the Great Barrier Reef? **Australia/Oceania**
32. During winter which ocean is almost completely covered in sea ice? **Arctic Ocean**
33. Which continent has no countries in it? **Antarctica**
34. What continent is Greenland part of? It is geographically considered part of the **North American** continent, politically, it belongs to Europe.
35. On which continent is Spanish the official language of most of its countries? **South America**
36. On which continent will you find the largest rainforest? **South America**
37. In 1498 Europeans began sailing around the tip of Africa to reach which ocean? **Indian Ocean**
38. Death Valley is the lowest point on which continent? **North America**
39. What ocean is the second largest ocean on Earth, covering over 21% of the Earth's surface?  
**Atlantic Ocean**
40. On which continent will you find the Vatican, the world's smallest country? **Europe**
41. Which continent is home to most of the world's marsupials? **Australia/Oceania**
42. What is perhaps the least known body of water in the world? **Arctic Ocean**
43. On which continent will you find the world's largest desert, the Sahara Desert? **Africa**
44. Which continent has the smallest population? **Antarctica**
45. Which continent is bordered by the Arctic Ocean on the North and the Caribbean Sea on the South-east? **North America**
46. On which continent is rice the staple food? **Asia**



47. Which continent through colonization, at one time ruled almost all of the rest of the world?  
**Europe**
48. Which continent has been the starting point of both World Wars? **Europe**
49. Which continent is the only continent joined to two others? **Asia**
50. Which ocean is the largest ocean, covering around 30% of the Earth's surface? **Pacific Ocean**
51. Which continent contains the world's biggest nation (China)? **Asia**
52. Which continent contains the world's Southern most city (Puntas Arenas)? **South America**
53. Which ocean's name refers to Atlas of Greek mythology, who, in myth, holds the world on his shoulders? **Atlantic Ocean**
54. Which continent contains the world's largest river system (The Amazon)? **South America**
55. Which continent contains the highest point on Earth (Mount Everest)? **Asia**
56. The Bermuda Triangle is located in which ocean? **Atlantic Ocean**
57. Which continent is the only continent where tigers are found in the wild? **Asia**
58. Which continent is joined to Asia by ice in winter (Bering Sea)? **North America**
59. Which continent is the only continent that lies entirely in the Northern and Western Hemispheres? **North America**
60. Which continent contains the world's tallest mountain (Mount Kea)? **North America**
61. Which continent contains the world's largest fresh water lake (Lake Superior)? **North America**
62. Which continent contains the fewest countries (Australia, New Zealand and Papua New Guinea)?  
**Australia/Oceania**
63. Which continent has more sheep than people? **Australia/Oceania**
64. Which continent is moving 2-3 inches every year? **All**
65. Where are there are more artifacts and remnants of history than in all of the world's museums, combined? **The Ocean**
66. Which ocean's name has an original meaning of 'peaceful sea'? **Pacific Ocean**
67. Which continent is the only continent that lies entirely in the Southern and Eastern Hemispheres?  
**Australia/Oceania**

Name \_\_\_\_\_ Date \_\_\_\_\_

# World Continents



land	water	continent
ocean	North America	South America
Europe	Africa	Asia
Antarctica	Australia	The World
Pacific Ocean	Atlantic Ocean	Indian Ocean
Arctic Ocean	Southern Ocean	

land	water	continent
ocean	North America	South America
Europe	Africa	Asia
Antarctica	Australia	The World
Pacific Ocean	Atlantic Ocean	Indian Ocean
Arctic Ocean	Southern Ocean	



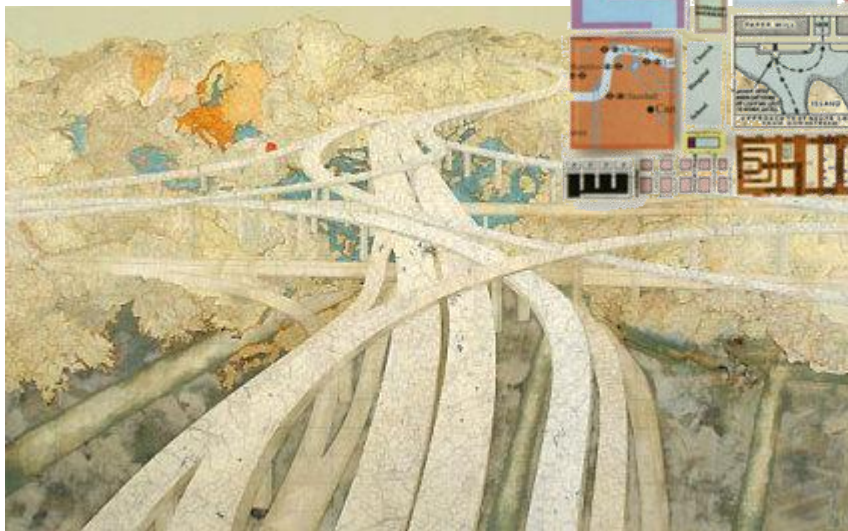
## You are Here...

Every day millions of people use maps to take them places. Mapmaking fulfills one of our most ancient and deep seated desires: understanding the world around us and our place

in it. But what about maps as a work of art? Maps can be simple tools, comfortable and unremarkable in their familiar form. Or they can lead to different destinations and show another kind of uncharted realm: the imagination, mapping out their creators' willingness to venture beyond the boundaries of geography or convention. Have students create new pieces of art by cutting maps and rearranging them into unusual collages. They can create landscapes, animals, figures, clothing, new cities, maps that go nowhere but wherever their imagination can take them.

### Materials:

- Old maps
- Glue
- Scissors
- Paper
- Imagination



## Lesson Extensions:

### Go Global

Want to expand your class postcard collection worldwide? Try the free, international mail-exchange website [postcrossing.com](http://postcrossing.com), which enables members to send and receive postcards from around the globe. (More than 6 million postcards have been sent from 204 countries to date.) Log on, get an address, mail a postcard, and you'll get one back. Each postcard offers a snapshot of life in another place, and the mystery of where your next card is coming from turns getting mail into a wonderful surprise.

### Surf the Earth

Get your students excited about geography by globe-trotting around the planet with Google Earth, free mapping software that lets users "visit" locations worldwide on a three-dimensional globe. (Go to [google.com/earth](http://google.com/earth) to download the application, then click on the "learn" tab for easy-to-follow video tutorials.) Here are some of our favorite features:

- **Follow Your Interests** The Google Earth Gallery boasts photographs, satellite images, 3-D tours, and in-depth videos on hundreds of topics, including shipwrecks, volcanoes, and Major League Baseball stadiums.
- **Take a Virtual Vacation** Users can zoom in on famous landmarks, such as the Eiffel Tower or the Grand Canyon, and get street-level views of cities and towns around the planet.
- **Play Tour Guide** With a few clicks of the mouse, your kids can create a personalized map of your hometown or a favorite destination with pictures and brief descriptions, then share it with family and friends.