The Shape of Illinois

Grade level:
3-8

Objective:
By the end of this lesson, students will have be able to interpret information on a topographical map, understand how glacial activity shaped the surface of Illinois, and discuss how the topography of Illinois affect agriculture in our state.

Illinois Standards:
SS.G.1.6-8.MdC
SS.H.3.4
SS.EC. 2.4
4-ESS2-2
CCRA.R.1

Adapted from Illinois Ag in the Classroom

Lesson Summary

Students will learn how glaciers shaped our state and how the shape of the land impacts agriculture as they make clay relief map of Illinois.

Materials Needed (Each student will need):

- The Shape of Illinois Student Information
- The Shape of Illinois Student Instructions
- Illinois Surface Topography Map
- Glacial Boundaries in Illinois Map
- non-drying modeling clay (about 1.5 oz. per student) or Play-Doh
- (1 - 1 oz. party-size container per student)
- glue (optional; see notes below regarding clay vs. Play Doh)
- corn kernels (1 per student)
- soybean seeds (1 per student)
- cow confetti (1 cow shape per student)
- pony beads: 1 white, 1 red, 1 blue, 1 green, 1 purple, and 4 yellow per student
- outline of Illinois (copy 2 outlines of Illinois onto 8 ½" x 11" sheets of heavy cardstock or tagboard and cut in half)
- paper clips or toothpicks
- pencils
- crayons, markers, or colored pencils: same colors as beads

Choosing the clay:

Non-drying modeling clay –

- Students may work on their maps over multiple days, as the clay will remain workable.
- Oil from the clay will seep into the cardboard over time.

Play-Doh–

- Relief maps must be stored in tightly sealed plastic bags until finished to prevent drying.
- Cracks will develop in the finished Play-Doh maps as they dry. Use glue to prevent beads and other items from detaching when the map has dried.

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Interest Approach

Glacial Movement – As glaciers moved across the North American continent during the Ice Age, they scraped, pressed, and reshaped the land's surface. Students can gain a better understanding of how this happened by making their own mini glaciers. You will need: access to a freezer, rectangular gallon container such as a plastic washtub, rocks and gravel, sand, and a stream table or other large, flat container.

- Freeze water, rocks, and gravel in a rectangular gallon container.
- Set up a stream table by creating a somewhat hilly landscape of sand.
- Leaving an area of the landscape that the glacier will not affect, start the "glacier" at one end by pushing it slightly into the sand.
- Set a lamp at the "south" end of the stream table to simulate warming.
- As time passes, check the regress of the melting "glacier." River systems, lateral moraines, terminal moraines, and glacial lakes should all develop within the sand.
- Discuss what has happened by asking the following questions:
  - What happened as the "glacier" melted?
  - What happened to the rocks and gravel within the glacier?
  - How is the land different where it was not covered by the glacier?
  - What would make this demonstration show more accurately how a glacier behaves?

(Adapted from the lesson "Gliding Glaciers," from the Illinois State Museum Geology Online)

Suggested Sequence of Events:

1. Read and discuss The Shape of Illinois: Student Information Sheet as a class. Emphasize the fact that topography affects what kind of farming can take place.
2. Use a projector to show class the two different maps of Illinois. As you show each, explain what kind of map it is and ask questions to prompt student thinking about how each map reveals unique information about our state.

   Glacial Boundaries in Illinois – This map shows the areas covered by different glaciers that affected our state between 1.8 million and 10,000 years ago.
   - Approximately where would our school be located on this map?
   - Over time, how many glaciers covered the area where our school is now?
   - Are there areas of Illinois that were never covered by glaciers? Where?

   Illinois Surface Topography – This map shows the topography, or shape of the land surface in Illinois. Ask students to look carefully at the colors shown in the legend and on the map. In general, the lighter the color, the lower the elevation affected our state between 1.8 million and 10,000 years ago.
   - Where are some of the hilly areas?
   - Where is our state fairly flat?
   - In which part of our state are the highest elevations located?
   - In which areas are the lower elevations?

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Suggested Sequence of Events cont.

3. Discuss how color-coded maps show that some areas have higher elevations than others, but a three-dimensional relief map can show this even more clearly.
4. Explain to students that they will be creating their own, three-dimensional relief maps of Illinois. Distribute materials listed under activity to each student.
5. Project or distribute color copies of the Glacial Boundaries in Illinois map and Illinois Surface Topography map.
6. Once all students have received their materials, instruct them to follow the directions on their Student Instruction Sheet to create a three-dimensional relief map using the clay. They will need to refer to the Illinois Surface Topography and Glacial Boundaries in Illinois maps as they create their own relief maps.
7. Once all students have completed their maps, discuss the process as a class. Address the following questions:
    - Where is our state the hilliest?
    - Where is our state fairly flat?
    - In which part of our state are the highest elevations located?
    - In the area where our school now stands, is it hilly, flat, or somewhere in between?
    - Is Illinois overall basically flat, hilly in areas, or mountainous?
    - Are there places on the map where the terrain slowly changes?
    - Are there places on the map where the terrain drastically changes?
    - How does the shape of the land impact farming in Illinois?

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Teacher Resources

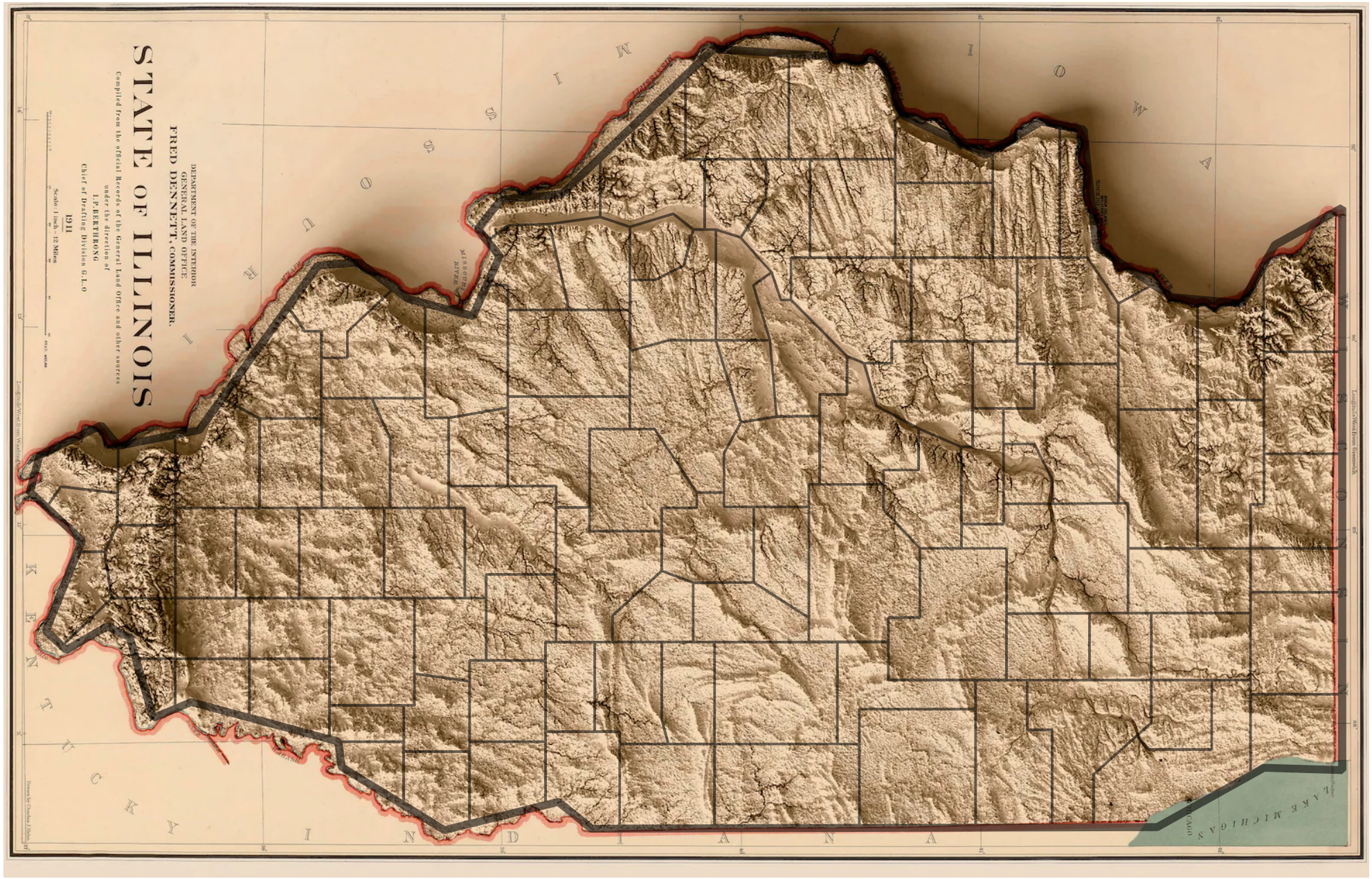
Vocabulary

- **Driftless Area** – an area of land surface largely unaffected by glacial drift; this term is commonly used to describe the Northwest corner of Illinois
- **end moraine** – a prominent ridge of rock debris dumped at the end of a glacier and formed of boulders, sand, gravel and clay; also known as terminal moraine
- **forage** – grasses, small shrubs and other plant material that can be used as livestock feed
- **glacial drift** – term for all the deposits of earth and rock materials moved by glacial activity
- **glaciation** – alteration of a land surface by a massive movement of ice
- **glacier** – a huge mass of ice, formed on land by the compaction and recrystallization of snow, that moves very slowly downslope or outward due to its own weight; forms in areas where the rate of snowfall constantly exceeds the rate at which the snow melts.
- **ice sheet** – a very large body of land-based ice; also known as a continental glacier
- **loess** – a load of silt that is produced by the erosion of glacial outwash and transported by wind. Much loess found in the Mississippi Valley is believed to have been deposited during the ice ages of the Pleistocene epoch
- **Pleistocene** – The epoch that extended from about 1.8 million years ago to 10,000 years ago on the geologic time scale; when the most recent glaciations occurred
- **relief map** - map which shows depth in real three-dimensional structures
- **silt** - fine particles of soil that can be picked up by wind or water and deposited as sediment
- **terrain** - the surface features of an area of land; also known as topography
- **three-dimensional** – any object or area having height, width, and depth
- **topographic map** – a map showing elevation and the shape of the terrain (such as hills, peaks, and valleys) using raised-relief, shaded-relief, or contour lines
- **topography** – the set of physical features, such as mountains, valleys, and the shapes of landforms, that make up a given landscape
- **two-dimensional** – any object or area having height and width, but no depth; flat

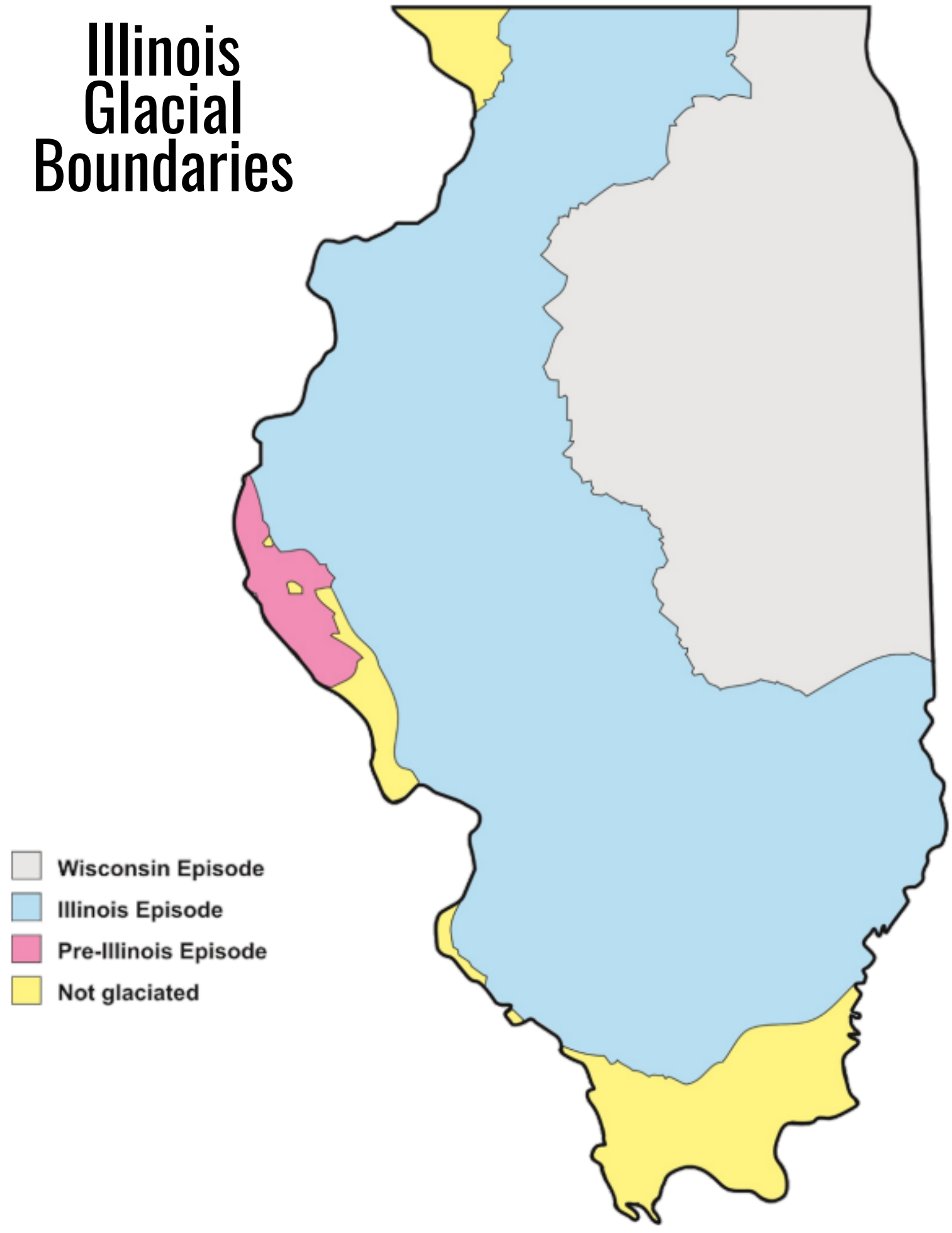
Additional Resources

- The Illinois State Geology Survey is a good source of information on Illinois geology, including effects of the glaciers. Several free downloads including maps and fact sheets are available from their website at https://www.isgs.illinois.edu/.
- The Illinois Department of Natural Resources also has resources on glaciation in Illinois. Visit https://www.dnr.illinois.gov

Illinoi Surface Topography



Illinois Glacial Boundaries



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Student Instructions

Materials Needed:

- *Illinois outline printed on cardstock*
- *modeling clay*
- *toothpick or paper clip*
- *pencil*
- *1 corn kernel*
- *1 soybean seed*
- *1 small cow cutout*
- *1 red bead*
- *1 green bead*
- *1 white bead*
- *1 purple bead*
- *1 blue bead*
- *4 yellow beads*
- *crayons, markers, or colored pencils*

Follow the directions below to create a relief map.

1. You will begin with a blank outline of Illinois printed in the center of a piece of stiff cardstock. This will become your map.
2. Write your name on the lower right-hand corner of your map.
3. Label the top center of your map with the words "Illinois Relief Map." (In geography, the word "relief" refers to the highest and lowest elevation points in an area.)
4. Work the clay in your hands for a while to soften it. Spread the clay to evenly fill the outline of Illinois.
5. Look at the Illinois Surface Topography Map. The higher areas of the state are shown in dark yellows and browns. Shape your clay to show the **high areas** in the state.
6. Using a toothpick or paper clip, shape the clay to show the **hilly** parts of the state.
7. Some of the best soil in the world for growing crops like corn and soybeans is located in central Illinois. Press a **corn kernel and a soybean seed** into the clay towards the middle of your map.
8. Some parts of Illinois are too hilly and rocky to grow crops. Even in these areas, though, the rich soil supports pastures for grazing animals like cattle. More dairy and beef cattle are raised in the hilly northwest corner of Illinois than anywhere else in the state. Press a **cow** shape into the clay in northwest Illinois.
9. Many farm products are transported on barges on the Illinois River. Looking at the Illinois Surface Topography Map, you can see this river starting in the middle of the northern half of the state. It runs at an angle to the southwest, or down and to the left on the map. Use a toothpick or paper clip to show the **Illinois river**.
10. Make a **compass rose** on your map to show the directions north, south, east, and west.
11. Write on your map to show **Lake Michigan** and the **Mississippi River**.
12. Write on your map to show the location of the states that touch Illinois: **Wisconsin, Indiana, Kentucky, Missouri, and Iowa**.
13. Mark the **northern boundary** of Illinois with a **red bead**.
14. Mark the **southern tip** of Illinois with a **green bead**.
15. Show the location of the town **where your school is located with a white bead.**
16. Use a toothpick to draw the **outline of your county**.
17. Show where our state capitol **(Springfield)** is located with a **purple bead**.
18. Compare the Glacial Boundaries of Illinois Map with the Illinois Surface Topography Map. What do you notice about the "Not glaciated" parts of the state? Mark these **unglaciated areas** of the state with **yellow beads**.
19. The northwest corner of Illinois is the highest and hilliest part of the state. It is known as the **Driftless Area** because no "drift" (rocks, sand, and clay) was left there by glaciers. Mark this area with a **blue bead.**
20. Using crayons, markers, or colored pencils, create a **legend** on your cardboard to show what each colored bead and shape represents.

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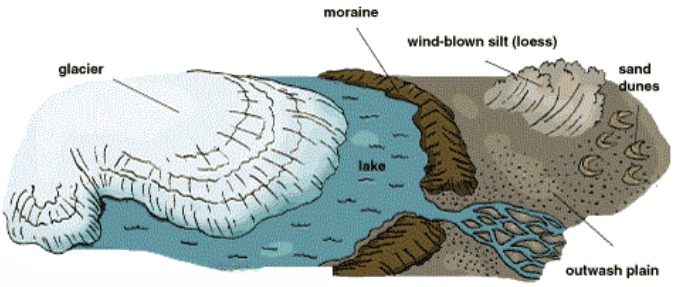
Student Information Sheet

Topography, or the shape of the land, impacts farming. The landscape in most of Illinois is either fairly flat or gently rolling. Because of this, and because Illinois has rich soils and an ideal climate, crops like corn and soybeans are widely grown here.

However, not all of Illinois flat. The northwest corner of Illinois, including parts of Jo Daviess, Stephenson, and Carroll counties, is one of the hilliest regions of the state. This region is part of a larger area known as the Driftless Area. ("Drift" is another word for rocks, sand, and clay left behind by glaciers.)

The Driftless Area (also known as the Driftless Region) began nearly 2 million years ago during the Pleistocene Epoch. This area covers parts of southern Minnesota and Wisconsin, northwestern Illinois and northeastern Iowa. Its name, the "Driftless Area" comes from the fact that it was never covered by glaciers in a region which had many glacial episodes. Because the area wasn't leveled and covered by continental glaciers, the ancient land surface has been exposed to almost continuous weathering and erosion. This erosion carved a series of deep valleys into the gently tilted bedrock formations, with the Mississippi River Valley draining the entire area.



Massive sheets of ice (continental glaciers) hundreds of feet thick flowed southward from centers of snow and ice accumulation in the far north. They covered parts of what is now Wisconsin and Illinois several times. The topography of most of Illinois was flattened by the repeated advances and melting of glaciers, which scoured and scraped old preglacial erosional surfaces into outwash plains. Although the glaciers did not cover the Driftless Region, nor completely surround it at any one time, outwash deposits of silt, sand and gravel were dumped into the Mississippi River Valley.

In the Driftless Area, exposed bedrock not directly eroded by the ice was indirectly affected by a layer of fine, wind-blown silt called loess. When these deposits dried out, prevailing winds from the northwest settled out the finer materials such as fine sand and silt, and carried them across the unglaciated terrain, further shaping it into the fertile hills of today.

Because of the hilly terrain, farming in the Driftless Area looks very different than it does elsewhere in Illinois. Corn, soybeans, and other crops are still raised in this area, but farmers must take extra care to prevent soil from eroding down the steep hillsides. In many cases, a better use of the land is to raise grazing livestock such as dairy or beef cattle. By doing so, farmers can still produce food while leaving the valuable soil protected by grasses and other forage vegetation

Image source: Kevin-Palmer.com