

Where do Rivers Come From?

Modeling Topography

This lesson will model the topography of Earth's surface. The lesson will focus on the topography of watersheds in NC. It can be adapted to represent your local region. Students will observe how water flows in drainage basins.

At the conclusion of the lesson, students will have a general understanding of the topography of Earth's surface.

Overview

This lesson will show how water flows over Earth's surface. The learner will observe that water flows from high elevations to low elevations. The learner will observe that water flows in the same path under the influence of gravity.

Key Search Words

Earth Science, 9th grade, topography, watershed, drainage basin, tributary, river, stream, ground water

Learning Objectives

- The learner be able to explain how water flows along the Earth's surface by creating a model of a drainage basin
- The learner will be able to predict the direction the water will flow based on the shape of their drainage basin model.

Curriculum Alignment

Related Next Generation Science Standards (NGSS)

- ESS2.C: The Roles of Water in Earth's Surface Processes

Related North Carolina Essential Standards

- EEn.2.3.2 Explain how groundwater and surface water interact
- EEn.2.4.2 Evaluate human influences on water quality in NC's river basins, wetlands, and tidal environments

Classroom time required

- Tentatively, one block (90 minutes) should be sufficient to present the lesson. If extra time is needed, adjust as necessary.

Materials & Technology

**This activity was adapted from the Drops to the Ocean: A GIS study of River Basins activity (part A-Drainage patterns and Terrain Inquiry), Jones, G. et al (2009). *Extreme Science from Nano to Galactic (1st. ed.)*. NSTA Press.

- Aluminum foil (12 x 12 in piece per student)
- Colored water
- Small plastic cups
- Internet access or copies of paper maps
- WEBSITE
- Student Data Sheet
- Computers or computer access (If students do not have access to individual computers, they can work in pairs sharing a computer)

Safety

Lab goggles should be worn during the activity.

Teacher Preparation for Activity

Distribute materials for lab activity part A: Drainage patterns and Terrain Inquiry.

Each student will have a set of each of the materials listed.

Students can also work in pairs.

Student Preparation for Activity

Discuss map terminology, contour, contour lines, elevation, steepness, centric circles, depressions, other landmarks.

Procedure

- Distribute materials to each student
- Instruct the students to fold the aluminum foil in the following manner (You can model this as the students are doing each task)
 - Fold the foil in half each way, then unfold it.
 - Fold the edges of the foil to form a tray.
 - Put four drops of colored water in the center of the tray.
 - Put a drop colored water in each of the corners
 - Sketch the path the water takes
- Next, ask the students to ball up the foil.
- Unfold the aluminum foil, but don't flatten it out. (The foil should look like a mini mountain range)
- Place the edge of the foil on a book, so that it sits at an angle,
- Fold the edges to form a tray.
- Drop colored water at each corner and in the center of the foil.
- Sketch the path that water takes and discuss where it ends up.

Differentiation

English as a Second language Learners (ESL)

- Will complete a vocabulary sheet to familiarize themselves with new vocabulary. (This can be done whole group or independently with a whole group check afterwards)

Regular Ed/Gifted Students

- Activity can be extended by teaching students how to read and interpret actual topographic maps.

Assessment/Check for Understanding

Students will write a story with illustration(s), describing the path a drop of water can take as it travels over Earth's surface (topography). Students are encouraged to be as creative and imaginative as possible (stumbling blocks along the way, such as their drop is trying to reach its family of droplets in the ocean...but it evaporates while en route and has to take a different route to reach its family).

Alternative assessments

- Students can create a comic strip showing the path that drop takes as it flows over Earth's surface (topography).

Required resources

Student worksheet, found at the end of this lesson.

Supplemental resources

[Discover NC River Basins](#)

Sources

Jones, G. et al (2009). Extreme Science from Nano to Galactic (1st. ed.). NSTA Press**

<https://www.education.com> (vocabulary worksheet source)

[Discover NC River Basins](#)

<https://pubs.usgs.gov> (topographic map extension activity sheets)

Appendices

See Attachments at the end of this document

Vocabulary Activity

Directions: Using the definitions below, compose a fill-in-the blank short story about where water ends up as it flows over Earth's surface. Use the space provided below.

| Term | Definition |
|-----------------------------|---|
| Topography | The physical features of a place, or the terrain—such as mountains, valleys and floodplains. |
| Watershed | Areas of land around a smaller river, stream or lake. |
| River/Drainage basin | The land that water flows across or under on its way to a river. |
| Tributary | a freshwater stream that empties into a larger stream, river, lake or ocean |
| River | Freshwater that flows over the Earth's surface the empties into another body of water, such as a lake or the ocean. |
| Stream | A small river, that often emptied in to another stream or a river. |
| Groundwater | Water that seeps into the soil as it travels. |

Modeling Topography

Background:

This activity will simulate the surface of the earth and observe the flow of water as it flows across its uneven surface.

Pre lab Questions:

1. Define topography
2. How does the shape of the Earth's surface affect the flow of water?

Materials:

Each person will need:

- Aluminum foil (12 x 12 in piece per student)
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- Sketch the path that water takes and discuss where it ends up

Name _____ Date _____ Blk/Pd _____

Data:

Sketches of the path water takes as it flows across the surface of the model

Sketch your drawings in the spaces provided.

| Sketch one | Sketch two |
|------------|------------|
| | |

Conclusion/Discussion

1. Describe the surface of the river basin model.

(Answers may vary, but students should make references to it being uneven, some areas are higher/lower.)

2. As you observed the colored water flowing, how did the surface affect its path flow?

(Answers may vary, but students should make reference to the direction of the flow, that the water ends up and collects in lower regions, and/or how slow or quickly the water flows)

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