

# Tundra Topography

## 3 EXTENSIONS



### Section 2 TUNDRA ACTIVITIES

**Grade Level:**4-12

**State Standards:** Geo B-1,  
Geo C-3

**Subjects:**Science,geography,  
language arts, art

**Skills:** Vocabulary building,  
teamwork, spatial relations

**Duration:** Two 45 minute  
classes

**Group Size:**Partners or small  
groups

**Setting:** Indoors

**Vocabulary:** Active layer, frost  
boils, high-center polygon,  
ice wedges, low-center  
polygon, permafrost, pingo,  
slumping, solifluction/  
gelifluction, talik,  
thermokarst, wetlands

### Objective:

Students will describe 5 varieties of tundra topography.

### Teaching Strategy:

Students read about and construct models of characteristic lowland tundra topography.

### Complementary Activities:

“Permafrost” in this section; “Vehicles on the Tundra” and “Puzzler: Tundra and Permafrost – Icy Balance,” both in Section 5, Human Impacts.

### Materials:

Copies of “Permafrost Features” from INSIGHTS Section 2 for each student, blocks of modeling clay or batches of baker’s clay or play dough (*recipes at end of activity*) for each group, cardboard box (or similar container) about 4 x 6 inches (10 x 15 centimeters) to hold the modeled tundra topography.

OPTIONAL: container with one or more see-through sides.

### Background:

See INSIGHTS Section 2, *Topography and Soil*.

### Procedure:

1. Students read the descriptions of tundra topography in INSIGHTS Section 2.

2. Divide the class into groups of 2 to 4 students with each group focusing on one of the following features: **frost boils, high-center polygons, ice wedges, low-center polygons, pingos, slumping, solifluction/gelifluction, taliks, thermokarsts.**

3. Give each group a block of modeling clay, baker’s clay, or play dough to build a model showing a topographic feature of permafrost soil. Models can be finished in small containers. Some topographic features such as talik and ice wedges may be more suited for a see-through type of container.

For example, the model may demonstrate the thermokarst depressions created by vehicle traffic over the tundra. Details could include small “lakes” draining into the road or model cars “driving” on the



roads. Using the correct terminology, students label their models.

4. Each group should freeze its model if appropriate and/or add water to represent the flow of surface moisture. Some models will be more realistic if actually constructed with water added in repeated freeze-and-thaw steps.

5. Each group describes its model and topographic features to the class. When describing the model to the class, students use accurate terminology and concepts.

### Evaluation:

Students describe and illustrate 5 types of tundra topography.

### EXTENSIONS:

A. **Talk with engineers or geologists.** Students research the topographic features with engineers and geologists in the area. Contact engineers who specialize in tundra soils. Invite them to present information to the class.

B. **Create a mural.** Students create a mural showing the parts of tundra (including soil). Students attach labels and descriptions to the mural.

C. **Apply knowledge to road damage.** Using the information gathered from this lesson, students answer the following question: "Why does a road break, buckle, and form potholes in the spring?" Students will design and perform an experiment to

demonstrate this phenomenon. They may choose to conduct another experiment showing other effects of permafrost on soil.

### Curriculum Connections:

(See appendix for full citations)

#### Books:

*A is for Arctic* (Lynch)

*The Arctic Land* (Kalman)

*Biomes of the World - v.1* (Allaby) 7-12

*Land Above the Trees: A Guide to American Alpine Tundra* (Zwinger) 9-12

*A Naturalist's Guide to the Arctic* (Pielou) 9-12

*Tundra* (Kaplan)

*Tundra* (Sayre)

*Tundra* (Walsh-Shepherd)

*U-X-L Encyclopedia of Biomes - v.3* (Weigel) 7-12

#### Website:

How ice wedges and permafrost features are created (link to "Habitat") <[arctic.fws.gov](http://arctic.fws.gov)> (Arctic National Wildlife Refuge)

### Teacher Resources:

(See appendix)

#### Baker's Clay

4 parts flour  
1 part salt  
1.5 parts water

Adjust proportions to make clay capable of being formed and modeled. Mix with hands and knead 6 minutes. Baker's clay may be air-dried or baked in moderate oven one hour or more until hard. Additions may be glued on with diluted white glue.

#### Play Dough

1 cup salt  
1.5 cups flour  
0.5 cup water  
2 tablespoons oil  
food coloring (optional)

Mix oil into water. Mix all ingredients together with hands. Knead on table. Store in refrigerator.

