

# **Title:** I Want a Gravestone That Lasts!

**Grave Level:** 5 - Science

## **Virginia SOL's:**

### **Earth Patterns, Cycles, and Change**

- 5.7 The student will investigate and understand how the Earth's surface is constantly changing. Key concepts include
- a. the rock cycle including identification of rock types;
  - e. weathering and erosion; and
  - f. human impact.

**Introduction:** This activity is for a self-guided tour of the Old City Cemetery for students studying the rock cycle, erosion, or weathering.

### **Objective:**

In this activity, students will investigate the effects of weathering on gravestones.

### **Materials:**

Digital camera

Map of the Old City Cemetery

Identification guides for lichens and rocks and minerals

Lesson worksheets

### **Teacher Background**

- Weathering is a slow process. Some rocks erode faster than others. The conditions causing the deterioration may be chemical, physical (temperature change) and biological activity.
- The durability of rocks varies with climate, composition, and exposure to weather.
- Rocks that are rich in quartz, such as granite, are highly resistant to chemical weathering. On the other hand, marble, which consists of soluble calcite, is more easily weathered by acidified precipitation. Medium-grained quartz sandstone containing feldspar and micas are much less soluble than marble. Fine-grained sandstone consisting almost entirely of quartz is very insoluble and hence, more resistant to chemical weathering.
- Both moisture and heat promote chemical reactions. Weathering generally goes deeper into rock materials in a moist warm climate than in a dry, cold one.
- Rocks provide an environment for lichens to grow.
- Weathering is an intrinsic part of erosion and so participates in the rock cycle.
- Examples of stages of weathering for your tombstones:
  1. Unweathered.
  2. Slightly Weathered - faint rounding of corner of letters.
  3. Moderately Weathered - rough surfaces, letters still legible.
  4. Badly Weathered - letters and difficult to read.
  5. Very Badly Weathered - letters almost indistinguishable.
  6. Extremely Weathered - no letters left, scaling.

### **Pre-Lesson**

- Visit the Old City Cemetery ahead of time to identify the study areas containing tombstones that exhibit a range of weathering and different rock types.
- Contact local monument maker. Consider inviting him or her as a guest on the field trip or to give a classroom presentation.
- Collect identification references for lichens, rocks and minerals.

- **SAFETY NOTE:** Consult your school board's policy regarding safety precautions for outdoor excursions and plan your trip accordingly. Be aware of any students with allergies to insect bites and plants and ensure they carry the required medications. Students should wash their hands after handling soil, plants and equipment. Encourage students to wear sunscreen and appropriate clothing. Don't forget bug spray!

### **Procedure**

1. Review the rock cycle. Distinguish between weathering and erosion.
2. Discuss the assignment requirements. Organize students into groups of 2 to 4 members.
3. Have students sketch the weathering on different tombstones in the cemetery according to attached worksheet.
4. Leave time for post-lesson discussion and questions.

### **Post-Lesson Discussion and Questions**

Conduct a whole-class discussion around the results and the following questions:

1. Which rock type showed the greatest resistance to weathering? Why?
2. Which rock type showed the least resistance to weathering? Why?
3. What are the effects of weathering on rocks?
4. What types of weathering have affected the tombstones (e.g. physical)? Support your answer.
5. Which rock type would you choose for a gravestone? Why?
6. Why is the cemetery placed where it is? Consider the geology of the area.

### **Student Evaluation**

- Completion of worksheets and quality of observations
- Observation
- Peer and self-evaluation

### **Enrichment and Extension Activities**

- Visit a local monument maker. Watch carving in action. Find out the cost of a monument/tombstone for a rock of your choice. Which country is the rock from? Why did you select this type of rock?
- Contact the local Genealogical Society and invite a representative to join the field trip. These groups are experienced in the preservation of historical information and monuments, and may have insight or stories about the history of the cemetery and source of the stones.
- If some students have ancestors or family buried at the cemetery, encourage an independent study that takes this human factor into account. Why would the family have decided to use a particular type of stone? How much would they have had to pay for it? What is the oldest monument in the cemetery? What could students find out about the first families that settled in your area?
- Research why the cemetery is placed where it is. Is there a geological reason? Consider interviewing a gravedigger to obtain this information.
- Find out if the coffin requires a concrete cover to protect the groundwater from pollution (embalming fluid).
- Design an experiment to show how weathering occurs in the most weathered material seen during the study.

## Student Worksheet

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

Cemetery Location: \_\_\_\_\_

In this activity, you will investigate the effects of weathering on tombstones.

1. Walk through the assigned study area of the cemetery and observe the extent of weathering on the gravestones.
2. Choose 4 tombstones that vary in condition from un-weathered to extremely weathered. For each tombstone, record the following information in the provided chart:
  - a. Identify the extent of weathering on the tombstone(s) you observed:
    1. Unweathered
    2. Slightly Weathered - faint rounding of corner of letters.
    3. Moderately Weathered - rough surfaces, letters still legible.
    4. Badly Weathered - letters are difficult to read.
    5. Very Badly Weathered - letters almost indistinguishable.
    6. Extremely Weathered - no letters left, scaling.
  - b. Note which areas are weathered. Sketch a few representative letters to illustrate the extent of weathering (if a digital camera is not available).
  - c. Identify the rock type and color.
  - d. Note the presence (or absence) of lichens.
  - e. If lichens are present, examine them closely. What type are they? Do they grow on the sheltered sides of the tombstone or on all sides? What is the effect of biological weathering?
  - f. Calculate the age of the tombstone.
  - g. Mark each of your four tombstone locations on the cemetery map.
3. Does stone orientation to the wind also have an impact on the extent of weathering? Explain.
4. Find the oldest gravestone in the cemetery. Describe the extent of weathering and the type of rock used.

**TOMBSTONE #\_\_:**

**Tombstone Age:**

**Rahn's Index:**

**Rock type and color:**

**Lichens: Present or Absent?**

**Lichen description (if present)**

**Description of weathering**

**Sketch or digital photograph of tombstone**

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