Idaho Standard 1: Nature of Science
2.S.1.2.1 Make observations, record data, and interpret data. (558.01.a)
2.S.1.6.3 Analyze information and evidence. (559.01.d)
2.S.1.6.1 Identify questions to be investigated. (559.01.a)

Materials Needed
60 Chocolate Chip Cookies
Straws
Ice
Toothpicks
Eye Dropper
Small Cups of Water
Paper Clip
Goggles
Paper Plates

Lesson Objectives:
1. Students will be able to explain weathering and erosion.
2. Students will be able to explain deposition.

Lesson Introduction
- Review what students remember about Sedimentary Rocks.
- Examine the rock they created during the last class, and see how the layers have formed together.
- Explain that today we are going to see how we get the sediments to form Sedimentary Rocks.

Lesson Development
1. Explain that we will be talking about weathering, erosion, and deposition today. Explain that weathering is the breaking down of rocks into smaller and smaller pieces. **Ask students what they think might break a rock into small pieces.** Examples of weathering would be water running over rocks and knocking rocks together, wind brushing sand against rocks, ice in the cracks of rocks, glaciers, and plant roots. Then explain that erosion is the process by which water, ice, wind or gravity moves pieces of rock and soil. Examples could be a stream bed, the tide at a lake or the ocean, avalanche. Tell the students they will be discovering deposition for themselves later in the lesson.

2. Now explain that today we will be modeling the effects of weathering, erosion, and deposition on rocks, but instead of rocks we will be using cookies. (See attached page.) Show the students the eye dropper, straw, ice cube and toothpick. Have them guess what part of nature each represents when it comes to erosion and weathering. The eye dropper represents water, the straw wind, the ice cube a glacier, and the toothpick is a natural disaster. Explain that we will go through the steps of erosion and weathering together because there will be a time limit on how long each part of nature will be allowed to affect their cookie rock.

3. Now it is time to begin weathering their cookie rock. Give them each a pair of goggles, and a toothpick. Explain that the toothpick will represent a natural disaster affecting their rock first, and they will have one minute to use the toothpick to cause destruction. Then give them an ice cube and give them a minute with the ice cube. Then give them the eye dropper and some water on the cookie. Now have them make observations about what has happened to the cookie as they
have been weathering it. Have them make an observation about their cookie for each item they have used so far.

4. Now they will be eroding their cookie rock. Give them each a straw. Have them blow (wind) at their cookie crumbles (rock fragments) toward the center of the their plate. Then sweep their crumbs into a pile. It is time for deposition. If their cookie crumbs aren’t already too wet have them add a couple drops of water and squish them together. Explain that this is deposition, and ask what they think that means. Deposition is when sediment and rock fragments are added to a land form or land mass because they are deposited there by wind, ice, water, or gravity. They can now clean up their plates.

5. Now they will be using their knowledge of weathering, erosion, and deposition to become miners. Once again they will be using cookies, but this time they represent a coal mine. The chips are the precious pieces of coal they need to get out. They first must trace their cookie onto the grid paper because at the end they will have to try and put the cookie back into cookie shape again after they are done mining. The rules are they may use water, wind, and their toothpick to start the mining process, and they may not touch the cookie with their hands. They can only use the tools they have been given, and they cannot share their mining tools with their friends. If a tool breaks they can buy a new one, with a chocolate chip they have gotten out. Also after they have gotten a chip out they can upgrade from a toothpick to a paper clip for the cost of a chip. They will have 5 minutes to mine their cookie. After 5 minutes they need to put as much of the cookie (rock) fragments back into the original cookie shape as possible, but again using only their tools and not their hands.

6. Ask them if they thought it was easy to put their cookie back together. Ask they why it wasn’t so easy. Explain that it isn’t always nature that can cause damage to rocks and the land humans can also. This is why we need to be careful about how we treat the Earth because everything we do has an effect.

Lesson Conclusion
Review with the students what causes weathering, erosion, and deposition, and how they are related to one another.
Mining Rocks

E is for EXPLORE is a one stop resource for teachers and parents. We develop unique learning activities, and search the internet and compile additional great ideas from other sources. Our index helps you find what you need quickly and easily. Where we have posted ideas from other sources we provide easy links to those websites. Please visit those as well to see what else they have to offer. All E is for Explore activities conform to state common core curriculum standards.

Cookie Rocks and Mining
2 activities, Science and Economics:

1. **Cookie Rocks** - This experiment is inspired by **Kinderpond's** "C is for Cookie." Have all students sit around a large table. Give each kid a cookie. Then, have them destroy it!

   **Weathering**
   First, have them experiment with a toothpick. Next, give them an ice cube to see the effects of ice on a cookie. They'll use the cube to chop at the cookie. Then, hand out an eyedropper to represent rain. Kids squirt water on the cookie. Note: You could even use a spray bottle.
Erosion
Once their finished demolishing their cookie, pass out straws. Have kids blow (wind) their cookie crumbles (rock fragments) toward the center of the table. Then, sweep their crumbs into a pile.

Deposition
Add a couple drops of water to their crumbs (if needed) and squish them all together.

2. **Cookie Mining Economics** - Check out the Museum of Science and Industry's Cookie Mining Project. Kids excavate chocolate chips from a cookie; but, first they have to purchase the materials they need and stay within their price range!

**energy resources** (renewable vs. non-renewable) - You can also use this activity to explore . Kids get a soft and hard chocolate chip cookie (which represent 2 landsites). Can they dig out coal without harming the landsite? Which site was easier to retrieve the coal? Visit Third Grade Thinkers for instructions!

**MINING SUPPLY STORE**

- **cookies** - $3 to $7
  *price determined by chip plentifulness*
- **dowel** - $4
- **paper clip** - $6
- **toothpick** - $2