



Lesson 6. K-2. Making Bricks

Title: Making Bricks

Time: 45 minutes

Description: In this lesson, students are introduced to the concept of green building. They make their own hybrid adobe bricks to understand how today's green builders are blending traditional materials with new ideas.

Objectives:

- Students will define and use these vocabulary terms: *green building, adobe*
- Students will compare and contrast traditional adobe bricks with hybrid adobe bricks
- Students will explain how today's green building practices help the environment

Standards:

NSE (Science)

1. Abilities and understandings necessary to conduct scientific inquiry
4. Principles and theories of earth and space science: properties of earth materials, objects in the sky, changes in earth and sky

NCSS (Social Studies)

3. People, Places, and Environments: study of people, places, and environments

NCTE (English)

4. Students adjust their use of spoken, written, and visual language to communicate effectively with a variety of audiences and for different purposes

Materials:

- Five gallon-sized buckets
- Large bag of shredded paper
- Immersion hand blender
- Bag of soil
- 25-pound bag of red clay
- Bag of sand
- Grass or straw clippings
- Four one-cup measuring cups or scoops
- Large mixing bowls (one for every three students)
- Mixing spoons (one for every three students)
- ½-gallon empty cardboard juice or milk cartons (one for every three students)
- *Supplement #5: Bucket Labels* (one copy)
- *Vocabulary Cards #8 and #9*
- *Supplement #6: Traditional Adobe Structure*



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Advanced Preparation:

1. Several days ahead of doing this lesson in class, ask volunteers to bring in the following materials from home: shredded paper, grass or straw clippings, empty cartons, and any of the items on the materials list that students are willing and able to bring in to school.
2. The day before, have students prepare “brick molds” for the activity by cutting the empty cartons in half lengthwise (from top to bottom). Cutting the cartons lengthwise will expedite the drying process for the bricks because of the larger exposed surface area.
3. Also the day before, prepare each of the following buckets of brick ingredients:
 - In the first gallon-sized bucket, make paper pulp. Place shredded paper in bucket and cover with water. Soak for several hours. Use the immersion hand blender to blend mixture to a pulp. Drain and squeeze out excess water from the bucket.
 - In the second gallon-sized bucket, empty the bag of soil. In the third gallon-sized bucket, make clay sludge. Place the clay in the bucket and add about 2-inches of water. Once clay begins to soften and dissolve, knead the clay and add small amounts of water until the mixture resembles a toothpaste-like consistency.
 - In the fourth gallon-sized bucket, empty the bag of sand.
 - In the fifth gallon-sized bucket, place the grass or straw clippings. Make sure the clippings are chopped finely enough for the bricks – about an inch in length.
4. Place the materials in order on a table that students can easily access them. Cut apart the labels from *Supplement #5: Bucket Labels* and attach each to its corresponding bucket. Place a measuring cup in front of all buckets except for the clippings.

Background: While there are many newly-created green building materials and practices, some have been around for centuries. Adobe bricks have been used in buildings in desert areas around the world since ancient times. Hybrid adobe bricks are a new material that blends traditional adobe with modern sustainability practices. The bricks that students create in this lesson are intended to mimic the process, but the bricks are not intended for actual construction.

Do Now:

Hold up each of the vocabulary cards, one at a time. State the word, and have students repeat it. Ask, *Have you heard this word before? Do you want to make a guess about what it means?* Encourage students to brainstorm their own ideas. Reveal the definition on the vocabulary card. Ask for a volunteer to tape the word to the word wall, so that everyone can see it every day.

Mini-Lesson:

1. Tell students that they are going to learn more about green buildings by exploring the different materials that green builders use. One of those materials is adobe.
2. Project *Supplement #6: Traditional Adobe Structure* and ask,
 - What do you see?
 - Is this building old or new? How do you know?
 - What is this building made of?
 - Why do you think these people used adobe?
 - Do people still use adobe in buildings today?
3. Have students turn to a partner and brainstorm the advantages and disadvantages of using adobe to make buildings. Then, have students share their ideas with the class.



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4. Explain to students that adobe has been used in buildings for centuries. It is easy to make from readily-available and inexpensive resources. It is strong and provides good shelter. But, adobe bricks are heavy and hard to work with. Today's green builders are finding creative ways to improve adobe as a building material.

Activity:

1. Tell students that they are going to make new adobe bricks like today's green builders. They will work in small groups and use the materials in the buckets to make their bricks.
2. One at a time, show students the materials in the buckets. Ask students, *What is this? Are you surprised that it is in your brick? Why might green builders use this material? How does it help the environment?*
3. Place students in groups of three and give each group a "brick mold," a large mixing bowl, and a mixing spoon.
4. Have groups send a representative to gather the brick materials in the large mixing bowl by scooping out the correct amounts from the buckets.
5. Have students use the mixing spoon to combine the materials. Then, have them fill the mold with the mixture. Students should tamp down the mixture to release any air bubbles that might be trapped inside.
6. Have groups set their bricks to dry in a warm, sunny place. (**Note:** It will take several days to a couple of weeks for bricks to dry, depending on the climate. To expedite the drying process, the sides of the molds can be torn away once bricks are set.)

Assessment: Hold a class discussion. *What did you like about making your own adobe bricks? Which materials are new ideas? How do they improve the bricks? How do these bricks help the environment?*

Homework: Share the definition of "green building" with an adult and explain how the bricks you made in class are a green building material. Brainstorm at least two ideas for what might make a building "green." You can think of materials, or other ideas.

Modifications:

Teach students the concept of ratios. When preparing the buckets of brick materials, cover the icons on the bucket labels. Instead, give students ratios (50% paper, 20% soil, 20% clay, 10% sand, and a handful of clippings) and help students calculate the appropriate amounts to scoop out of the buckets. [Above Level Learners]

Extensions:

- In pairs or small groups, have students visit the site of a green building materials retailer to learn more about the different types of materials available. Have them collect information to share with the class and discuss how these materials might be used in their community.
- Have students draw or paint an illustration of hybrid adobe brick, making sure to show each of the materials they used. They should label each material and write one sentence explaining how this is a green building material.