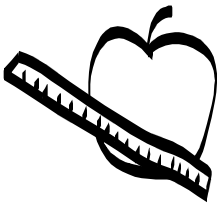


Let's Build an Arch

Arches National Park Quarter

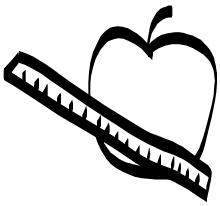
Grades Two and Three

OBJECTIVES

Students will understand how patterns of erosion affect the landscape. Students will describe the erosion processes that create specific geological features.

MATERIALS

- 1 overhead projector or equivalent technology (optional)
- 1 overhead transparency (or photocopy) of the "Arches National Park Quarter" page
- Copies of the following:
  - "Arching Over" worksheet
  - "Shaping Rocks" worksheet
  - "Shaping Rocks Checklist" rubric
  - "Let's Build an Arch" worksheet
  - "Construction Reflection" worksheet
- 1 class map of the United States
- Access to a collection of images of rock formations at Arches National Park from Web sites, such as:
  - www.nps.gov/arch/index.htm
  - www.nps.gov/arch/photosmultimedia/photogallery.htm
  - www.nps.gov/arch/photosmultimedia/multimedia.htm
- 1 copy of an age-appropriate text that gives basic information about erosion, such as:
  - *Weathering and Erosion* by Clive Gifford
  - *Erosion: Changing Earth's Surface* by Robin Koontz
  - *Erosion* by Joelle Riley
- Chart paper
- Markers, pencils and crayons
- Classroom building materials such as blocks, snap cubes, ice pop sticks, pipe cleaners and yarn
- Digital camera
- Rulers



Let's Build an Arch

PREPARATIONS

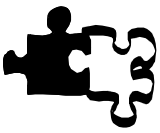
- Make an overhead transparency or equivalent technology of the "Arches National Park Quarter" page.
- Make copies of the following:
  - "Arching Over" worksheet (1 per student)
  - "Shaping Rocks" worksheet (1 per student)
  - "Shaping Rocks Checklist" rubric (1 per student)
  - "Let's Build an Arch" worksheet (1/2 sheet per student)
  - "Construction Reflection" worksheet (1 per student)
- Locate and print images of rock formations at Arches National Park (1 per student).
- Prepare a two-column chart titled "Ideas About Arches." Label the columns "We Predict" and "We Learned."
- Locate a text that that gives basic information about erosion (see examples under "Materials").
- Locate a collection of images of rock formations at Arches National Park.

GROUPINGS

- Whole group
- Small groups
- Pairs
- Individual work

CLASS TIME

Three or four 30- to 45-minute sessions, total 1.5 to 3 hours

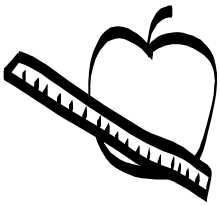


CONNECTIONS

- Science
- Language Arts

NATIONAL STANDARDS/COMMON CORE

- Next Generation Science Standards (NSTA)
  - 4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.



Let's Build an Arch

- Common Core State Standards (CCSS)
  - ELA-Literacy.W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.
  - ELA-Literacy.W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- Standards for the English Language Arts (NCTE/IRA)
  - Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

TERMS AND CONCEPTS

- Quarter
- Reverse (back)
- Arch
- Weathering
- Obverse (front)
- Arches National Park
- Erosion

BACKGROUND KNOWLEDGE

Students should have a basic knowledge of:

- The writing process
- Measurement

STEPS

Session 1

1. Display and examine the "Arches National Park Quarter" page. Locate this site on a class map. Note its position in relation to your school's location.
2. As background information, explain that the United States Mint began to issue the quarters in the America the Beautiful Quarters® Program in 2010. By the time the program ends in 2021, there will be a total of 56 quarter designs. Each design will focus on a different national site—one from each state, territory and the District of Columbia.
3. Tell the students that the front of a coin is called the "obverse" and the back is called the "reverse." Ask the students to tell you what they see in the image on the quarter's reverse. Describe the rock formation as an arch, but do not explain how the arch was created. This design depicts Delicate Arch, a 65-foot freestanding natural arch. It is a well-known Utah landmark and the park's most famous arch. The Olympic torch relay for the 2002 Winter Olympics passed through this arch.

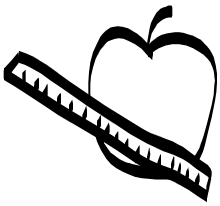
Let's Build an Arch

The Lasal Mountains are visible in the background.

4. Share a wide variety of other dramatic images of rock formations from Arches National Park.
5. Display the "Ideas About Arches" chart. Ask the students to brainstorm ideas about how all of these rock arches could have been created. Record student ideas in the "We Predict" column.
6. Tell the students that you will be reading a science book to them that may provide clues about how the arch was created. Introduce the students to the selected text about erosion. Read the text aloud. Ask the students to listen for clues about arches.
7. After the reading, ask the students to share what they learned about how rock formations such as arches are formed. Record student ideas under the "We Learned" column. Define key terms on the chart: "erosion" (the gradual destruction of something by natural forces such as water, wind or ice),"weathering" (changing by exposure to the weather) and "arch" (a curved formation with an opening formed by erosion and weathering).
8. Distribute a copy of the "Arching Over" worksheet to each student and explain the directions. Guide the students to respond to the prompt and include an illustration of a rock arch or other formation.
9. Ask students to share their work by reading their powerful statements aloud.

Session 2

1. Display the image of the Arches National Park quarter. Review with the students the material covered in the previous session.
2. Distribute to each student a printed photograph of one of the Arches National Park rock formations.
3. Distribute a copy of the "Shaping Rocks" worksheet to each student. Explain to the students that they will write a paragraph explaining how this rock formation might have been created using information from the reading. Direct the students' attention to the word box for support with science vocabulary.
4. Allow time for the students to illustrate their rock formations and write their paragraphs.
5. Distribute a copy of the "Shaping Rocks Checklist" rubric to each student and guide the students to review their work.
6. Have the students share their work with a partner.
7. Explain to the students that in the next session they will create their own arches using classroom building materials.



Let's Build an Arch

Sessions 3 and 4

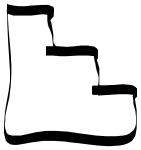
1. Display the image of the Arches National Park quarter. Review with the students the material covered in the previous sessions.
2. Explain to the students that in this session they will be creating their own arches.
3. Divide the class into small groups or pairs. Distribute a copy of the "Let's Build an Arch" worksheet to each group and explain the four tasks. Provide the groups with a wide variety of simple building materials and allow them time to create their arches. Record their work in digital photographs.
4. Discuss with the students the concept that nature is very powerful and able to do things that might be hard for humans to do. Distribute the "Construction Reflection" worksheet and ask the students to write their reflections on the arch-building experience.
5. Discuss the reflections together as a class. Collect the worksheets.

ASSESSMENTS

- Take anecdotal notes about the students' participation in class discussions.
- Use the students' worksheets and the "Shaping Rocks Checklist" rubric to evaluate whether they have met the lesson objectives.

ENRICHMENTS/EXTENSIONS

- Have students research famous man-made arches.
- Have students learn more about erosion through the Arizona quarter lesson for grades four through six at www.usmint.gov/kids/teachers/lessonPlans/50sq/2008/0406-3.pdf.
- Have students work with the school art teacher to create arches from a variety of materials.

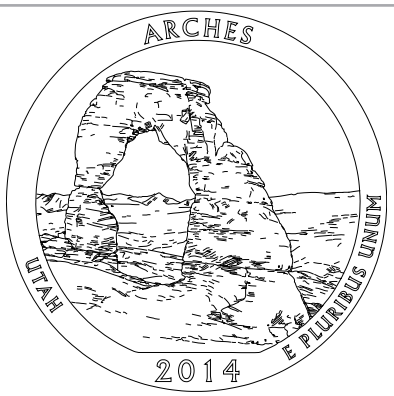


DIFFERENTIATED LEARNING OPTIONS

- Allow students to dictate written responses.
- Allow students to complete worksheets with a partner.
- Provide a model for students to follow when building the arches.

Name _____

Arching Over



Directions: Remember what you learned about the rock formations in Arches National Park. Write about how the arches in the park were formed. Include an illustration.

Nature is powerful! _____

_____

_____

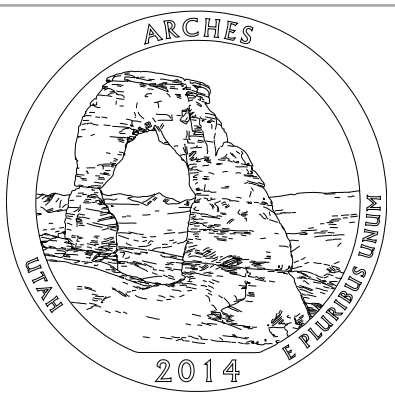
_____

_____

Name _____

Shaping Rocks

Directions: Think about how rock arches are formed in Arches National Park. Looking at your photograph of an Arches National Park rock formation, draw the arch. Use the word bank to write a paragraph about how that specific arch was formed.

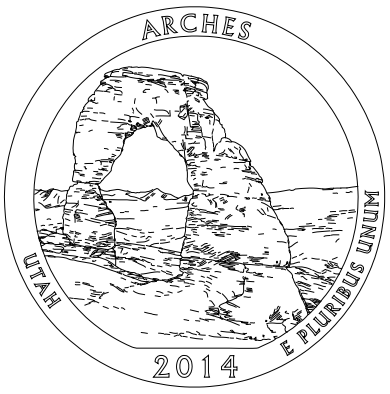


WORD BANK

erosion
weathering
rock
wind
water
ice
arch

Shaping Rocks Checklist

Rubric



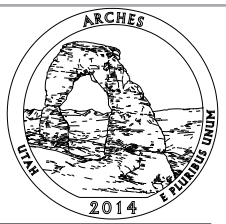
Directions: Complete this checklist about your "Shaping Rocks" paragraph. Mark each row that applies to you. A novice is just beginning to demonstrate, a practitioner sometimes demonstrates and an expert demonstrates always.

ELEMENT	NOVICE (BEGINNING)	PRACTITIONER (SOMETIMES)	EXPERT (ALWAYS)
I wrote a paragraph with at least 5 sentences.			
I correctly used the science vocabulary.			
I explained in detail how erosion might have created the rock formation in my specific picture.			

Teacher Comments

Name _____

Let's Build an Arch



Directions: Remember what you learned about how rock arches are formed in Arches National Park. Use classroom building materials to build your own arches.

TASK #1
Build a stable arch
of any size

TASK #2
Build a stable arch
that is 8 inches tall

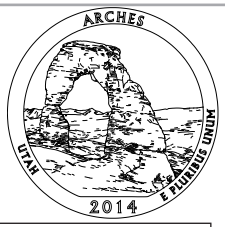
TASK #3
Build a stable arch
that can span 8 inches

TASK #4
Build a stable arch 8 inches tall
that can span 8 inches

United States Mint Lesson Plans

Name _____

Let's Build an Arch



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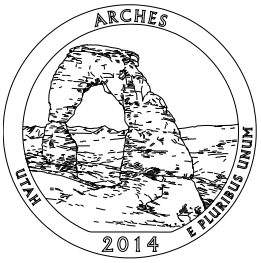
TASK #4
Build a stable arch 8 inches tall
that can span 8 inches

Name _____

Construction Reflection



Directions: Think about your experience building arches and answer these questions.

1. How did you feel when you were trying to build the arches?

_____

_____

_____

_____

2. How did this affect how you think about the arches in Arches National Park?

_____

_____

_____

_____

3. What are you still wondering?

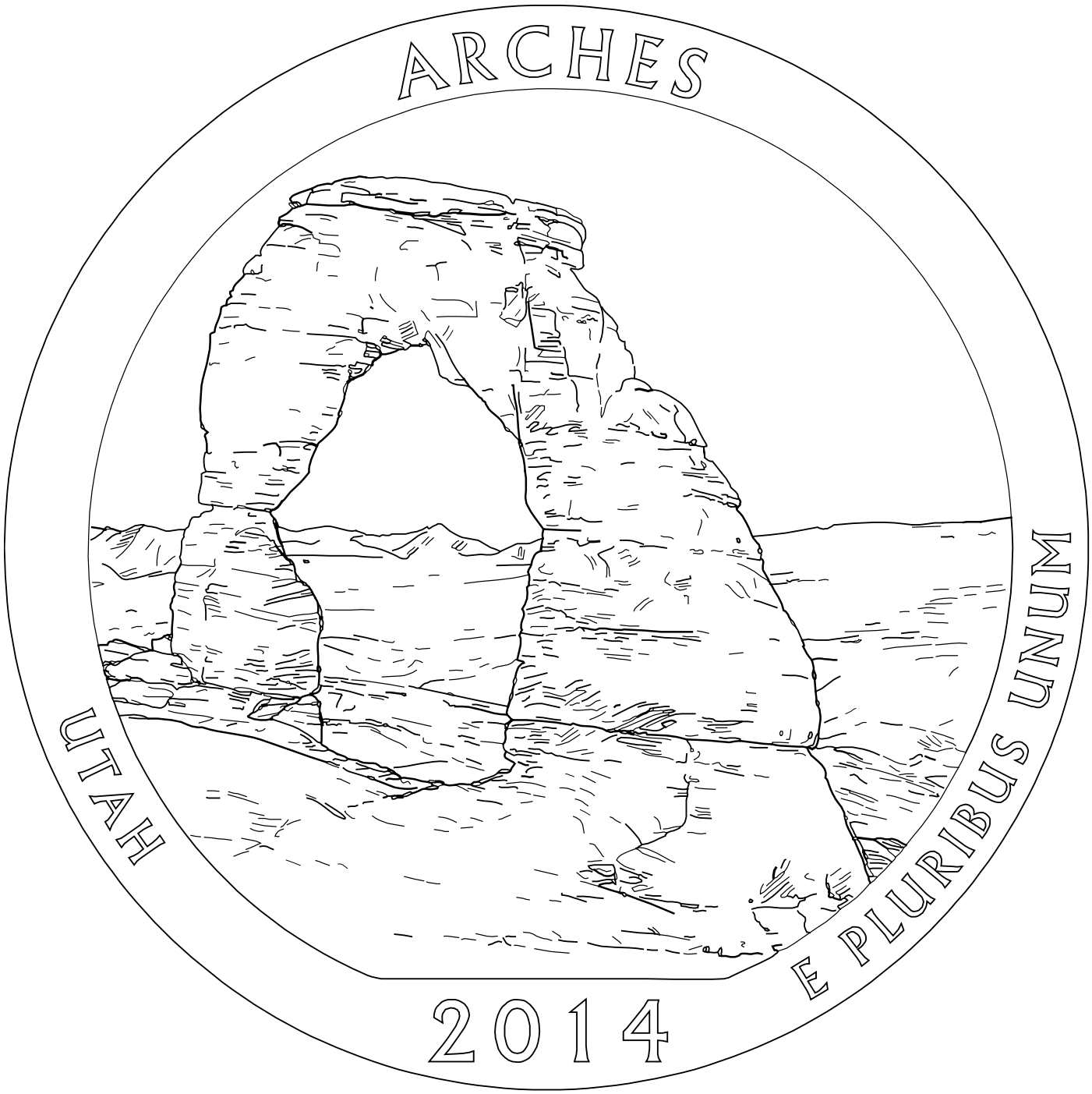
_____

_____

_____

_____

Arches National Park Quarter



The United States of America