It is important to realize that land on our planet, or geosphere, makes up only about 1/4 of the Earth's total surface. Land features include mountains, deserts, polar regions, valleys, plains, prairie, farmland, forests, and wetlands. Each of these features shares a portion of the total amount of land on the planet.

Students tend to think of the land on the planet as being limitless, yet simple calculations demonstrate the fact that the amount of land is limited. The quality of this limited amount of land must be maintained. Human beings have a responsibility to conserve land, use it wisely and protect its quality.

The purpose of this lesson is for students to acquire an understanding of the fragile nature of land as a resource.

**OVERVIEW**

By observing (or performing) the slicing of an apple, students become aware of the small fraction of the Earth's limited land resources that support all human life.

**OBJECTIVES**

After participating in this activity, students will be able to:
- Deduce that only a small fraction of the Earth supports all human life.
- Understand fractions when counting and coloring pieces.
- Describe major features of the Earth's surface.

**BACKGROUND**

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**PROCEDURE**

As you go through this brief demonstration, ask the students the questions that are in quotation marks before revealing the answers noted in italics.

1. Show the apple to the class. "For this exercise, this apple represents our planet."
2. Slice the apple into quarters.
3. Hold out three quarters. "What does this part of the apple represent?" They represent the water and oceans of the world.
4. “What fraction is left?” 1/4 “This represents all the land on the earth.”

5. Slice this section in half. Hold up one of the pieces. “This portion represents the areas where people can’t live: the polar areas, deserts, swamps, very high or rocky mountains.” Set this piece aside.

6. Hold up the other piece. “What fraction of the whole apple is this?” 1/8 “This piece represents the land where people can live, but not all of the soil is good for growing food.”

7. Slice the 1/8 piece into four equal sections. Hold out the single section. “What fraction of the apple is this?” 1/32

8. Hold out the three sections in your left hand. “These 3/32 represent the areas too rocky, too wet, too cold, too steep, or with too poor soil to actually grow food. They also contain the cities, suburbs, highways, shopping centers, schools, parks, factories, parking lots and other places people live, work, or use in other ways, but can no longer grow food.”

9. Carefully peel the 1/32 slice of Earth. Hold this peel out so they can see it. “This tiny bit of peeling represents the surface, the very thin layer of the Earth’s crust upon which food is grown to feed everyone on Earth. It is less than five feet deep. It takes 100 years for one inch of this topsoil to form.”

10. For dramatic effect, you can eat the small piece of apple peel, saying, “If we do not take care of this land, it will be gone.”

11. Discuss with the students their observations.
   - Did they realize the small fraction of Earth that supports all human life? What were the other features of the earth’s surface?
   - What things cause land erosion? One example is deforestation and loss of natural vegetation. Branches and leaves shelter the soil from the force of rain and wind. Root systems help to hold soil in place. So when trees and vegetation are lost, the soil is blown and washed away.
   - What are some ways we could help to preserve natural open-space and farmland? By choosing not to build anything on land that could be used to grow food. Or, when building is necessary, use wise land use planning and building practices.

12. Assign students to complete the Slice of Planet Earth math worksheet. This can be done in pairs, individually, or for homework. It can also be done while performing the slicing activity or during a review of the slicing.

13. Have students practice retelling the Slice of Planet Earth activity to their partner. Allow them to use apple pieces or a worksheet to explain different parts of the Earth. Assign the students to also retell the story as homework.

**ASSESSMENT OPTIONS**

1. Have each student write the ending to this statement, “I learned that...” Was the student surprised by the tiny piece of potential farmland at the end of the lesson? If potential farmland is 1/32 of the earth’s surface, what are the other features of the earth’s surface? Name and/or draw these features.

2. Assess the mathematical understanding of fractions by evaluating the students’ worksheets for completeness and accuracy.

**Adaptations/Extensions**

1. If the students are unable to cut an apple, allow them to cut a soft round pear with a plastic knife.

2. Assign students to perform this demonstration at home for parents and/or siblings. Have them conduct an interview after the demonstration to get feelings and responses from the audience.

**Computer Extensions**

   Abstract: I continued helping the class learn ways to compare fractions. As always, I learned a great deal from the students, especially from their written work. Most revealing to me was the variety of strategies that students developed for comparing fractions. (...) I describe some of what I learned from their writing and offer suggestions for how you can use writing with your students.


6. Shodor. FRACTION FACTS 2002. 9 May 2002. <http://www.shodor.org/interactivate/lessons/fractionfacts.html> Teacher lesson plan: discussions and activities are designed to introduce students to fractions, including operations with fractions, converting fractions to decimals and percents. The activities provide ample practice opportunities to reinforce the information from the discussions.
SOURCE

Worksheet developed by Anne Williamson, curriculum consultant for United Growth for Kent County, a grant project of Michigan State University Extension.

ADDITIONAL RESOURCES
Contacts:
- Grand Valley Metro Council
- Land Conservancy of West Michigan
- Michigan Department of Agriculture
- Michigan Farm Bureau
- Michigan Farmland and Community Alliance
- Michigan Geographic Alliance
- Michigan Land Use Institute
- Michigan State University Extension
- Timberland Resource Conservation and Development
- U.S. Department of Agriculture
- United Growth for Kent County

References and Teacher Resources:

Additional Lessons:
- Read aloud to the students Fanny's Dream by Caralyn Buehner. (New York: Dial Books for Young Readers)

CONCEPTUAL FRAMEWORK REFERENCE
IIA1, IIB1, IID1, IIB1
A Slice of Planet Earth

Name:___________________________________

Directions: Fill in the missing answers and follow the instructions.

1. The apple, representing the earth, is divided into _________ equal parts.
2. Color 3/4 of the apple blue. This represents all the water on earth.
3. Continue dividing the whole apple into 32 equal parts.
4. Outline the remaining 1/4 of the apple green. This represents all the land on earth.

5. Fill in the missing numerator.
   A. \( \frac{32}{32} \) of the apple are blue, and represent water covering the earth.
   B. \(\frac{32}{32}\) of the apple are outlined in green, representing land on the earth.

6. Color in 1/2 of the green section with brown. This portion represents land where people cannot live such as mountain tops, deserts, and polar caps.

7. Color in 3/32 of the remaining green section with red. This section represents cities and unfarmable land such as wetlands and rocky areas.

8. Fill in the missing numerator.
   A. \(\frac{32}{32}\) of the apple are unlivable (brown).
   B. \(\frac{32}{32}\) of the apple are unfarmable (red).
   C. \(\frac{32}{32}\) of the apple is left for farmland and open space! (white)

9. Actually, only the skin, or crust of the earth, is available for farmland. Circle the outside edge of the remaining 1/32 green section, and label it “Farmland”.

EXTRA CREDIT: On plain paper, draw 32 apple pieces.

A. Color 3/4 of the pieces blue. These represent water covering the earth.
B. Color 1/8 of the pieces brown. These represent land where people cannot live such as mountain tops, deserts, and polar caps.
C. Color 3/32 of the pieces red. These represent cities and unfarmable land such as wetlands and rocky areas.
D. Outline in green the last white 1/32 piece, this represents open space and land available for farming on the earth’s crust. Label it “Farmland”.