Ice, Ice, Ice

Integration: Science; Language Arts

Grade Levels: 4-6

Time: 2-3 class periods

Materials:

- Map of Antarctica (students size can be found at www.yourexpedition.com and www.nationalgeographic.com/xpedition/main.html)
- Map of the world
- Plastic sandwich bags
- Twist ties
- Buckets
- Water
- Research materials (books, encyclopedias, internet, etc.)

Objectives:

Students will:
1. Explain the amount of ice that is found in Antarctica.
2. Distinguish between different ice formations found in Antarctica.
3. Understand the behavior of icebergs.

Lesson:

Full Group

1. Ask students to describe what they think the land in Antarctica is like. Is it tropical? Is it full of forests?

2. Conduct a mini-lecture on the ice in Antarctica.
   a. Inform students that Antarctica is a continent almost entirely covered with ice.
   b. About 98% of the continent is covered with ice with 2% being barren rock.
   c. This equals 91% of all of the ice on the planet.
   d. The ice is an average of 1.5 miles (2.3 km) thick and reaches almost 3 miles (4.8 km) thick at its thickest point.
      - Point out landmarks that are 1.5 and 3 miles away to give students a perspective of how thick the ice is.
   e. Tell students that Antarctica holds 70% of all the freshwater in the world!
      - If the ice melted the ocean levels would rise more than 150 feet (45m).

3. Tell students that the ice is found in 2 ice sheets, separated by the Transantarctic Mountains. Have students identify the mountain range and the two areas covered by the ice sheets on a map.

4. Ask students which of the sheets is the larger by looking at a map. (The East Antarctic Ice Sheet, which covers East Antarctica, is the larger and thicker of the two ice sheets.)
   a. It is a land-based ice sheet. If the ice were removed, the land below it would be visible above sea level.

5. Tell students that the other ice sheet is known as the West Antarctic Ice Sheet. If is smaller and is marine-based. If the ice were removed, some of the land beneath it would be under water.

6. Inform students that each winter the sea around Antarctica freezes. This almost doubles the size of the continent. When summer approaches, it thaws and the size of Antarctica is reduced.

7. Ask students if they know the names of any other ice formations that can be found in Antarctica.

8. Write the word *glacier* on the board. Tell students that a glacier is a large body of ice that moves slowly down a slope or mountainside. There are many glaciers in Antarctica.
   a. Glaciers were formed when snow fell hundreds of thousands of years ago and became compacted into ice.
   b. This ice is slowly melting and this causes the ice to move down the mountains and out toward the ocean.

9. Write *ice shelves* on the board. Ask students if they can guess what these formations look like by seeing their name.
   a. Ice shelves are bodies of ice that extend from the land and float out onto the water on the edge of Antarctica. They resemble shelves lying on the surface of the water.
   b. They are thick ice formations and can be 1000 feet (300 m) thick.
   c. Point out the Ross Ice Shelf and the Ronne Ice Shelf on the map of Antarctica.
   d. Tell students that the ice shelves can be extremely large.
      - The Ross Ice Shelf is the size of the state of Texas.

10. Tell students that pieces of ice shelves and the edges of the ice sheets that cover Antarctica break off on a regular basis. The term used to describe the breaking off is *calving*.

11. Tell students that *icebergs* are formed when ice shelves and ice sheets calve.

12. Ask students what they already know about icebergs.

a. Icebergs are floating pieces of ice of various sizes and shapes.
b. One iceberg was known to be the size of Belgium. Have students find Belgium on a world map.
c. Icebergs may break into smaller pieces. They can take years to melt.

13. Inform students that while icebergs may look large on the surface, 80% of the iceberg is beneath the water.

14. Tell students that icebergs float because ice contains pockets of air in its structure that make it lighter than the water.
    a. A cup of ice is lighter than a cup of water.

15. In small groups, students will investigate the behavior of an iceberg by conducting the following experiment.
    a. Fill a plastic sandwich bag with water. Leave room at the top for the water to expand as it freezes.
    b. Close the bag with a twist tie.
    c. Place the bag into the freezer until the water is frozen.
    d. Once the water has frozen, peel away the bag. The ice will act as an iceberg.
    e. Fill a bucket with water and place the "iceberg" in the water and observe how it behaves.
        - The "iceberg" will float because it is lighter than the water.
        - Most of the "iceberg" will be beneath the surface of the water.
    f. Draw a picture and describe what you see.

16. In groups, have students create fact sheets describing the ice formations in Antarctica. Have students research the ice formations further and create an illustrated sheet for each.

ALTERNATIVE: This activity can be assigned as a long-term project.

Assessment:

Teachers will assess:
1. Student's ability to describe the ice formations found in Antarctica
2. Student's ability to perform the demonstration as directed.
3. Student's ability to work cooperatively.