

# POLAR CHALLENGE SPARKS

## PROGRAM COMMITTEE

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### INTRODUCTION

The International Polar Year (IPY) is a large scientific program focused on the Arctic and the Antarctic from March 2007 to March 2009. IPY, organized through the International Council for Science (ICSU) and the World Meteorological Organization (WMO), is actually the fourth polar year, following those in 1882-3, 1932-3, and 1957-8. In order to have full and equal coverage of both the Arctic and the Antarctic, IPY 2007-8 covers two full annual cycles from March 2007 to March 2009 and will involve over 200 projects, with thousands of scientists from over 60 nations examining a wide range of physical, biological and social research topics.

It is also an unprecedented opportunity to demonstrate, follow, and get involved with, cutting edge science in real-time. More information available at <http://www.ipy.org>

### CHALLENGE - Complete 5 activities

1. **International Polar Year:** Find out about the International Polar Year and being a polar scientist.

Pretend to be a polar scientist, and explore your own mini polar region. Each girl or group of girls will need: a 3-4ft. piece of string or rope, a magnifying glass (optional), and 6-8 toothpicks with flags or other identifying feature on them. This is an outdoor activity for winter or early spring, so make sure the girls are properly dressed. Each girl/group will place her string in a circle to identify her exploration area. Then using her eyes and the magnifying glass identify interesting features and use the flags to mark them. Ideas of things girls could chose to identify are: vegetation, rocks, cracks in the snow, changes from ice to snow, pools of melting snow, etc. Girls should then give other girls in the unit a tour of their exploration area, including the names they gave to the locations marked with the toothpicks.

2. **People of the Arctic and Antarctic:** People who live in the polar regions of the world experience long periods of complete darkness. Thus, when the sun reappears they are pretty excited. Create a song or dance to celebrate the return of sunlight in Polar regions.
3. **Animals of the Poles:** Watch the movie March of the Penguins. Talk about what life is like for a penguin.

4. **Saltwater in Polar regions:** The sea near McMurdo Station, Antarctica, is  $-2^{\circ}\text{C}$ , but the water is not frozen at that temperature. Why? In this activity, girls can explore some of the properties of water and ice by making their own ice cream.

MATERIALS (per girl):

- 2 heavy duty ziploc bags per girl—1 large and 1 small
- $\frac{1}{2}$  cup milk, 1 Tablespoon sugar,  $\frac{1}{2}$  teaspoon vanilla,
- ice, salt, spoons and bowls to eat icecream

DIRECTIONS:

1. Place the milk, vanilla and sugar in the small Ziploc bag and carefully close it, being sure there are no leaks.
2. Place the small bag inside the larger one.
3. Surround the small bag with ice to  $\frac{1}{2}$  the large bag capacity.
4. Give each pair of girls a different amount of salt (Guides, Pathfinders, and Rangers). Girls will add the salt to their ice, NOT to their ice cream mixture!
5. On the board, make a graph for collecting data including amount of salt and time it takes to freeze.
6. Shake the bags until the ice cream freezes.
7. Girls should check frequently and as soon as theirs freezes, add their time to the graph.
8. While eating the “experiments,” discuss how it works.

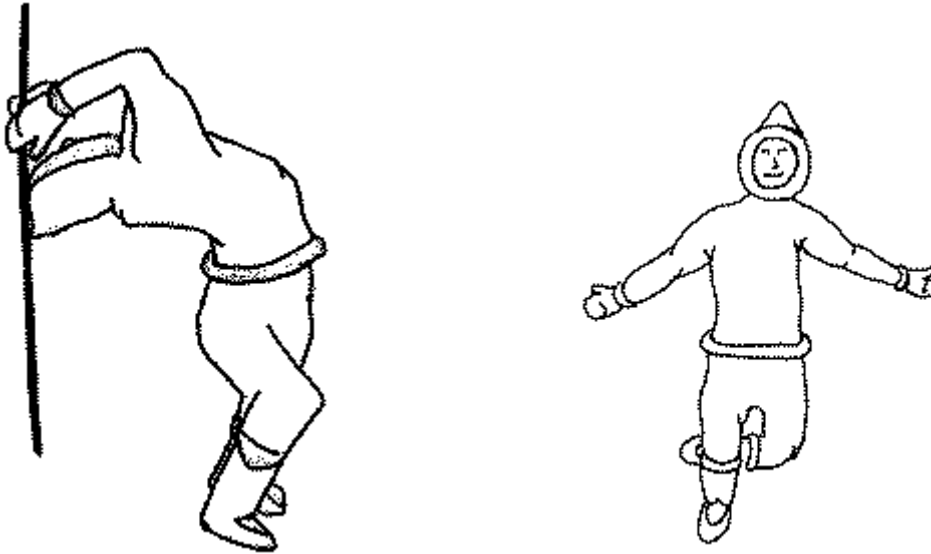
SCIENCE BACKGROUND: Living in Canada, the girls live with ice and snow in the winter, thus the concept of melting ice with salt is not new. It is sprinkled on sidewalks and snowplows spread it on roadways to melt the ice. As salt is added to ice, the freezing point of the ice is lowered. Water will normally freeze at  $0^{\circ}\text{C}$  ( $32^{\circ}\text{F}$ ). A 10% salt solution freezes at  $-6.67^{\circ}\text{C}$  ( $20^{\circ}\text{F}$ ), and a 20% solution freezes at  $-16.7^{\circ}\text{C}$  ( $2^{\circ}\text{F}$ ). By lowering the temperature at which ice is frozen, heat transfers out of the milk mixture into the brine solution and the milk freezes into ice cream.

5. **Glaciers:** The Polar regions have many glaciers, but so do the mountains near us! Take a trip to the mountains and visit a glacier in Banff, Jasper, or another park. Does it look like the glacier is growing or shrinking? If you visit in summer, can you see or hear the glacier melting? Take pictures of the glacier to document your visit.
6. **Polar Games:** Learn to play some traditional Inuit Games. Discuss how these games may relate to way of life in the Polar regions.

Animal Sounds: Place pictures of different animals in the middle of the circle ensuring there are two pictures of each animal. People jig around the circle. When the music stops everyone grabs a paper and starts to make the noise of their animal. The two people who have the same animal noise must find each other. Once the pair finds each other they sit down although they can continue making the noise if they like. Continue until everyone is matched up then start again.

Dog Sled Race: The girls are lined up in teams at one end of the playing area. The first girl on each team runs down the length of the playing area and back, then picks up the second girl on her team (she holds onto the first girl's waist). Together they run down the playing area and back, then pick up the third girl in their team, etc., until the whole team is running together.

**Back Bend:** This is an activity that our girls do very well with. The object of this activity is to bend backwards as far as possible and return to a balanced upright position while holding a metre stick to your nose. The stick must touch the mat behind the girl without resting on it or bouncing. Once the mat is touched, you must return to a standing position without moving your feet! Proper stretching is a must !



**Owl Hop:** The goal is to hop as long as possible on one foot. The instep of one foot must be placed behind the knee of the hopping leg. The participant must only use one leg throughout the activity, and each hop must completely clear the floor. Set to music and with a crowd cheering, this is a popular activity - especially with younger children.

**7. Climate Change in Polar Regions:** There is a lot of snow and ice in the Polar regions in the form of glaciers, icecaps, sea ice and icebergs. Complete the Ice Investigations below to determine if a warming climate that melts the snow and ice would cause a sea level rise.

#### **Ice Investigation #1: If icebergs melt, will sea level rise?**

Materials (per pair or team): deep dish pie or cake pan, toothpick, modelling clay, 2-3 ice cubes, water, clear plastic wrap

1. Give each team of girls a pan and a lump of clay.
2. Mould the shape of a continent, pressing the edges flat against the pan.
3. Pour in water to partially cover the clay continent.
4. Put several ice cubes in the water to represent icebergs and sea ice. (Note: The more ice you use, the easier it will be to see any changes in water level.)
5. Trace the water level into the clay with a toothpick or pencil.
6. Cover the pan with clear plastic wrap to prevent evaporation of the water.
7. Observe the marked water line as the ice melts. Does the water level rise? Why or why not?

## **Ice Investigation #2: If glaciers and icecaps melt, will sea level rise?**

1. Use the same pans and continents from investigation #1.
2. Place 2-3 new ice cubes on top of the clay continent to represent glaciers or icecaps.
3. Observe the marked water line as the ice melts. Does the water level rise? Why or why not?

**SCIENCE BACKGROUND:** Water contracts as it cools until it reaches about 4°C. It then expands by up to 10% as it freezes, making it less dense than liquid water. (You can check this out by freezing a carefully measured volume of water in a plastic measuring cup, then checking the volume again.) Melting icebergs will not raise sea level because the volume contracts again when the ice melts. The amount of water displaced by the floating ice is equal to the volume the melted ice will occupy in the water body. Melting icecaps and glaciers raise sea level, however, by adding more water to the ocean from the land.

**8. Countries of the Arctic:** Canada is one of the countries with land in the Arctic, what other countries are in the Arctic? Look at a map or globe and identify other countries with land above the Arctic circle (Greenland, United States, Russia, Finland, Iceland, Norway, Sweden). While Antarctica is not owned by any one country, several countries claim land there and even more countries conduct research there (United States, Japan, Russia, China, New Zealand, Italy, France, Germany, United Kingdom, Argentina, Chile, South Africa, and Australia).

Learn how to say “hello” in the language of countries within the Arctic Circle and that conduct research in Antarctica:

Argentina, Chile: Hola (OH-la)

Canada, U.S., U.K., South Africa, New Zealand, Australia: Hello

China: Ni hao (nee-Ha-OW)

Finland: Päivää (PIE-vah)

France: Bonjour (bohn-Zhoor)

Germany: Hallo or Guten Tag (goo-tan tag)

Greenland: Hej ( hey)

Iceland: Hæ (hi)

Italy: Buon giorno (bwohn-JOR-noh)

Japan: Konichiwa (koh-Nee-chee-wah)

Norway: Hei (hi)

Russia: dravstvuite (ZzDRAST-vet-yah)

Sweden: Tja (sha)