Un example of activities for teachers about Antartica thematics

• Thermos challenge (understand thermal insulation)
• Competition to build a model icebreaker boat
• Interdisciplinary activities: science, history and literature with the discovery of the continent by the great explorers
• Adaptation of polar terrestrial animal species (compactness)
• Build a thermohaline circulation model (southern ocean)
• Build an airship
• Classify Antarctic marine wildlife
• Assess the surface of the Antarctic with geometric shapes
Thermos Challenge

Average duration 2h with scientific lighting:

- thermometers equipment
- Timers
- Plastic bottles
- Glass bottles
- beakers
- Polystyrene pieces
- Pieces of wood
- Sheep wool
- Pieces of fabric
- Hydrophilic cotton
- Plastic bags
- Aluminum foil
- String
- elastics
- Tape
- Modeling clay
- Pair of scissors
- Cutters
- Oil
- A water source
- Apparatus for making hot water (eg kettle)
- Ice cubes ...
Thermos Challenge

1. Make a group of 3-4 people
2. Choose all the material they want, and build their Thermos (1h)
3. Distribute a sheet of paper board by group and a marker and encourage them to write a scientific poster explaining: the choice of materials, their methodology / assumptions, a schema of the device, and their explanations on the efficiency of the thermos.
4. Each Thermos will then be subjected to a temperature test with hot water and a thermometer probe. whoever gets the slowest temperature drop wins the challenge!
5. Explain with a presentation the explanation of the physical phenomena involved in this experiment

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Adapt to cold: compactness
Adapt to cold: compactness

What are the 2 factors to consider?

• The shape, and therefore the ratio between the volume and the exchange surface: this is called compactness
• The size, and therefore the total volume

What experience (s) to verify it?

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Experience
1. The impact of size.

Equipment:
- Pat to model
- Balance

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Experience 1. The impact of size.

Equipment
- 2 thermocouples
- 1 refrigerant mixture:
  - 500g crushed ice
  - 150g coarse salt
  (ratio 0.3)
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Experience 1. The impact of size.

-Thermocouple 1: measurement of the temperature of the refrigerant mixture (control)
-Thermocouple 2: measurement of the temperature at the center of the sphere as a function of time

Point of vigilance !!!

-Recruit completely the objects with the mixture
Cooling mixture: take care not to have too large pieces or too liquid a zone in contact with the object
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Experience 2. The impact of the form.

Equipment:
- Pat to model
- Balance
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Experience 2. The impact of form.

Equipment

- 2 thermocouples
- 1 refrigerant mixture:
  - 1000g crushed ice
  - 300g coarse salt
    (ratio 0.3)
- Recover objects completely
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IN EQUAL SHAPE, THE SMALL VOLUME IS, FASTER IS COOLING
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At volume equal, cooling is slower in the case of the ball.
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\( V / S: \) compactness

Cold adaptation: increase of the compactness

Two solutions:
- Increase as much as possible \( V: \) big size
- Decrease as much as possible \( S: \) shape. Example sphere vs parallelepiped