Mous-icles

Outdoor Activity

Curriculum: Science, Physical and Outdoor Education, Math

Introduction:

In this activity, students are challenged to keep a ‘mouse’ from freezing in the winter. This is an engaging activity to help students consider how small animals stay warm in the winter. Extend your learning by considering insulating material and how animals lose heat to their surroundings. This activity is great for younger children but also works really well with junior and even senior high students

Materials:

- Collect film canisters (enough to have one for each student). Alternatively, since film canisters are hard to find these days use pharmaceutical containers (ask at your local drug store). The important aspect is that they completely seal without any water leakage.
- Consider putting coloured duct tape around the outside (as clear containers get lost easily). It’s also fun to add a little tail (we use flagging tape) to make the mouse slightly more visual in the snow.
- Fill the canister (2/3 full) before you begin this activity. If you fill the containers to the top the lids may pop off when (or if) they freeze solid.

Instructions:

- Gather the students outdoors and distribute one canister (mouse) to everyone.

- Challenge your students to find a safe spot for their mouse to spend the day. Ensure they know that they cannot leave anything with their mouse (e.g. a mitt or toque) and they have to be able to find it at the end of the day.
- At the end of the day or after a good amount of time (e.g. the morning) have your students collect their mice and discuss the findings. Conduct an inventory on how well the mice survived the cold (how many were completely frozen, partially, or not at all). Ask if there is any theories to why some survived and others didn't.

Discussion:

If there is deep snow (over 30 cm) then students should begin to conclude that the warmest place for the mice is at the bottom of the snowpack. Introduce students to the word insulation. Insulation is the opposite of conduction: a material that doesn't conduct heat or cold well is consequently a good insulator. Some students may have chosen to place their mouse where it was exposed and could benefit from the heat from the sun. Discuss the benefits and challenges of relying on this heat source for mice.

Learning Extension – Exploring Insulation

Introduction:

Students can extend their learning by exploring insulating material to keep their mouse warm.

Materials:

- film canister mouse (same as above)
- insulating material such as wool, nylon, cotton, Styrofoam, dish washing scrubbies, socks, etc. (consider including material from your school's lost and found such as hats and mitts.
- Tape, pins, twine and other fastening material
- thermometer

Instructions:

- Display all the material above and have students make an insulating jacket for their canister (mouse).

- Fill all the canisters with hot water (from the tap) and distribute to the students. Remind them that their mouse is rapidly cooling down already!
- Record the temperature of the hot hap water.
- Have students quickly place their mice in their insulating containers.
- You may choose to have each child insert a thermometer into their container – or periodically open and check the temperature of their mouse. Recording their temperatures every 10-15 minutes over a 2 hour (+) time will give them an interesting data set.
- Here comes the math. Have your students plot their data on graph paper. They can also compare the results of other students and graph them as well.

Discussion:

Have your students consider the following questions:

- Based on your graphs, who made the best ‘mouse insulator’?
- Which materials make the best insulator? The poorest?
- How would you improve your mouse insulator?
- Did your mouse cool at a constant rate over time or did it cool faster during a portion of the experiment time?
- (optional) Using the same insulating materials, vary the size of the mice. Try larger containers and see how the temperature varies over time. What might this indicate about larger animals and their tolerance to cold temperatures?