KU NATURAL HISTORY MUSEUM
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STEM Challenge: Building a Structure to Move on Snow
Story Book Science at Home Activity

What you need

- Small, heavy object, like a marble or a rock
- Material to model snow, suggested materials include: crumpled tissue paper or pillow stuffing
- Materials to create a structure to distribute the weight of the small, heavy object, suggested materials include: pipe cleaners, or string and popsicle sticks
- Optional: adhesive like tape or glue

Preparation

The goal of this challenge is to build a structure that allows for the distribution of an object's weight by increasing the area, or amount of space, that the object takes up.

The instructions use the following suggested materials: a marble as the small, heavy object, pillow stuffing as snow, and string, popsicle sticks, and tape for the structure that will distribute the weight of the small, heavy object.

Step 1. Take a small, heavy object, like a marble or a rock, and place it on top of a structure that models, or resembles, snow. You can use crumpled up tissue paper or pillow stuffing. This guide uses pillow stuffing. Observe what happens when the small, heavy object is placed on top of the model snow.

Step 2. Plan a design for the structure that you will build to distribute the weight of the small, heavy object. Then make a prediction about how different materials will act in your model.

Step 3. Gather the appropriate materials for your design. This guide offers suggestions for your materials, but you can use whatever household items you have.

Step 4. Use the materials to build the structure that will distribute the weight of the small, heavy object. The structure needs to distribute the weight of the object by increasing the area that the object takes up.

Step 5. Place the small, heavy object on top of the structure you built to distribute the object's weight. If the object does not stay in place on the structure, you can attach the object to the structure by using an adhesive like tape or glue.

Step 6. Observe what happens when you place the small, heavy object, attached to the structure used to distribute its weight, on top of the model snow. What happens? What do you notice as the outcome of this challenge?

What to do

When the small, heavy object was placed on top of the model snow without the support of a structure that distributed the object's weight, the small, heavy object fell through the model snow. When the small, heavy object was attached to a structure that distributed its weight, the object did not fall through the model snow as much as it did without the structure. The structure distributes the weight of the small, heavy object by increasing the area, or amount of space, that the object takes up.

Image 1. Without support of structure

Image 2. With support of structure

Using the pictures, compare and contrast how far the small, heavy object fell through the model snow without the support of a structure that distributed the weight of the object (Image 1) and with the support of a structure (Image 2).

Did you build a structure that distributed the weight of the small, heavy object? How might you rebuild your structure?

What is happening?

Animals that live in cold, frigid areas with deep snow have adaptations, or features that allow them to survive their environment. One animal that lives in an environment with deep snow includes the snowshoe hare. Snowshoe hares have large back feet with toes that they can spread out to increase the area their feet take up and distribute their weight. They need large back feet to travel on snow without falling through the snow!

Snowshoe hare (*Lepus americanus*). Image from National Park Service (NPS).

Information from "Snow and Animals" from the National Snow and Ice Data Center