

# Antarctic Explorer: Testing Magnets

## Adventure Description:

In this adventure, students will think like an Antarctic Explorer and test the effects of temperature on magnets used for extracting meteorites!

## Activity

Magnets for each group will need to be prepared at least one hour before class. Please follow instructions on [Handout: Teacher Prep](#).

### Step One: Background Information about Antarctic Explorers and Magnets (5 minutes)

- Explain to students that Antarctic explorers study and explore Antarctica. This can include animals and plants in Antarctica, as well as soil, rocks, and other materials! Some Antarctic explorers spend a lot of their time out in the freezing cold weather looking for meteorites! A meteorite is a solid piece of debris from an object, such as a comet, asteroid, or meteoroid, that originates in outer space and falls to the Earth. Tell students that most meteorites are magnetic. Show [Handout: Meteorites](#).
- Explain to students that magnets have two poles, a north and south pole. The magnets are strongest at the poles. Show [Handout: Magnets](#). Explain that magnets are attracted to the opposite pole of another magnet. For example, the north pole of one magnet would be attracted to the south pole of another magnet. The same south pole would repel away from the south pole of another magnet.
- Tell students that in a meteorite, there are different sections called “magnetic domains”, and they act like a tiny magnet with a north pole and a south pole. This means that the whole meteorite turns into a magnet!
- Explain to students that one problem that Antarctic explorers face every day is extreme cold! To search for meteorites with magnets, they need to make sure that the cold weather is not going to affect their magnets!

### Step Two: Testing Magnets in Different Temperatures (15 minutes)

- Explain to students that they will now conduct an experiment to test the strength of magnets in Antarctic conditions.
- Teacher note: If you do not have access to enough magnets for each group to perform their own experiment, move on to Step Three: Building an Extracting Device and use one magnet per group.
- Teacher note: Students can work in pairs or small groups.
- Provide students with [Handout: Testing Magnets](#). Walk through the steps as a class.
- Provide students with the following materials:
  - Garden or winter gloves
  - One staple (eject one staple from stapler)

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- Plastic or wooden ruler
- Refrigerator and freezer
- Once students have completed their room temperature magnet testing, give them their refrigerated magnet.
- Once students have completed their refrigerated magnet testing, give them their frozen magnet.
- While students are working, ask them the following questions:
  - Which magnet was strongest? Which magnet was weakest?
  - Teacher Note: In general, all types of magnets should work better at colder temperatures. This is because the molecules inside the magnets have less energy when their surroundings are cold. This makes the molecules inside the magnet more stable.

## Step Three: Building an Extracting Device (15-20 minutes)

- Explain to students that they will now create a device that can use magnets to extract meteorites in Antarctica!
- Provide students with **Handout: Building a Device**. Walk through the requirements as a class.
- Provide students with art supplies and recycled building materials (cardboard, egg cartons, plastic bottles, etc.) to build the prototype of the extracting device.

## Step Four: Discussion (5 minutes)

- Have all groups present their devices. Ask students why they made the design choices that they made.
- Explain to students that all magnets should work better at colder temperatures. This means that Antarctic explorers may be able to carry smaller magnets and still find meteorites!
- Extra Time? Ask students what other methods they could use to measure the strength of each magnet at different temperatures. Discuss as a class.
- Need help? There are several different methods for testing magnet strength. Students could grab a magnet and see how many staples can be lifted with a magnet, or testing to see if a magnet's field can still make something move through a piece of paper/cardboard.
- If you have extra time, have each group prepare their own method for testing the strength of their magnets. Allow students to showcase their results to the class.

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## Materials List

### Provided online:

- Handout: Teacher Prep
- Handout: Meteorites
- Handout: Magnets
- Handout: Testing Magnets
- Handout: Building a Device

### Not provided (each student or group needs):

- Permanent magnets (enough for each group to have 3 magnets)
- Garden or winter gloves.
- Staple (eject one staple from stapler)
- Plastic or wooden ruler
- Refrigerator and freezer

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