

# What is a Magnetic Shield?

Discover what materials act as a magnetic shield and do not allow the magnetic force to penetrate.

## Materials

- Round or rectangular magnets
- 2 pieces of cardboard 2" x 3"
- 2 pencils
- Tape
- 5 or 6 paper clips
- Popsicle stick
- Butter knife

## Instructions

1. Attach the pencils to one piece of cardboard using tape. Placing the pencils close to the edge of the cardboard will give more room to experiment.
2. Attach the second piece of cardboard to the pencils a "cardboard-pencils-cardboard" sandwich.
3. Tape the magnet onto the top of the cardboard.
4. Raise the paper clips to the bottom of the sandwich one at a time and see what happens. If nothing happens the magnet may be too weak, the cardboard too thick or the pencils too thick. This can be fixed by adding another magnet to the first one.

## Why does this work?

The magnetic field lines from the magnet pass through the cardboard and air. Materials like the popsicle stick that allow the magnetic lines of force to pass through them are called nonpermeable. The butter knife acts as a magnetic shield. The force lines coming down from the pole of the magnet do not pass through the metal knife. Instead, they are gathered in, travel down the metal knife, and re-enter the magnet at the other pole. Materials that gather magnetic lines of force are said to be permeable. Only magnetic materials are permeable.

## Other things to try...

- What do you think will happen when you add more paper clips?
- What do you think will happen if you insert a knife in the sandwich?
- Try insert a popsicle stick into the sandwich, what do you think will happen?