Poles Versus Middle

"I say it's the poles."
"Well, I say it's the middle."
"Poles."
"Middle."

Why not perform a test that will show which (if either) part of the magnet is stronger?

Materials
- A bar magnet
- A bunch of metal paper clips

To Do

Hold the bar magnet by one of its ends. Bring the other end of the magnet (a pole) into contact with one paper clip. Lift the clip into the air.

Slip together the loops of two paper clips to form a chain. Try lifting the chain with the opposite end of the magnet. Keep increasing the number of paper clips in the chain until you've reached the longest chain that can be picked up by the magnet's pole.

Make a prediction. Will the other pole of the magnet pickup more, fewer, or the same number of paper clips? Explain your thinking.

Now touch the center of the magnet (between the poles) to a paper clip. Try lifting the clip into the air.

What happens? How does the magnetic strength at the center of the magnet compare with the magnetic strength at the poles?

The Science

As you've just discovered, the poles of the magnet have the stronger force. If you were to "see" the magnetic force field, you'd find the lines of force converging—coming together—at the poles. This balanced pattern illustrates the equal strength of the north and south poles. There are far fewer lines of magnetic force near the magnet's middle. This results in a smaller magnetic attraction. Paper clips that are placed here will either drop from the magnet or slide over to the stronger pole regions.

Think about It. Why does the shape of a magnetized horseshoe result in its greater lifting capacity?