

## INSTRUCTIONAL GUIDE

## Contents

- Two Atmospheric Pressure Cups
- Instructional Guide



## Background

The original Magdeburg Hemisphere demonstration was staged in about 1656 by Otto von Guericke (1602 - 1686) in Magdeburg, Germany. He used a modified stirrup pump to remove the air from between two metal hemispheres that had been fitted together with grease. Teams of eight horses hitched to each hemisphere could not separate them.

**Instructions:**

Push the flat sides of the two halves together, removing as much air as possible from between them. Now try to pull them apart! The cups can be released by using the tabs on the edges.

## How it Works

The cups are held together by atmospheric pressure, which is approximately 15 pounds per square inch. A quick calculation leads to a total pressure of over 100 lbs. on each cup (assuming the air was completely evacuated from between the two cups). Try to avoid calling this apparatus “suction cups.” Using the word “suction” can cause students to focus on a fictitious force that pulls inward on the cups, when in fact the force is from the atmosphere pushing the cups together.

## Related Products

**Atmospheric Mat (P1-2010)** A simple design that demonstrates a powerful concept: atmospheric pressure! Place this rubber mat on any flat surface and pull on the handle. It's like the mat is glued down!

**Gas Laws and Pressure Discovery Bundle (P1-2070)** Don't just teach the gas laws. Let students deduce them with these exploratory activities!

**Vacuum Pumper and Chamber (P1-2140)** With this affordable hand vacuum pump and chamber set students can test the effects of reduced pressure on many different objects, such as marshmallows, balloons, and water.