

T E A C H E R S G U I D E



**VACUUM PUMP
(HAND HELD)**
ITEM # 6076-11

MECHANICS - DEMONSTRATION

- How can you create quieter spaces by subtracting something?
- When is a vacuum stronger than a group of horses?
- Where does the movie Finding Nemo give a lesson in vacuum pumps?

Create a vacuum and explore answers to these questions with this easy-to-use, handheld vacuum pump. Comes with gauge. Pumps 15 mL of air per squeeze of a comfortable handle and it can create a vacuum to 700mmHg of mercury.



Materials

- vacuum pump
- Internet access
- balloons
- bell jar
- paper cups
- movie clip of Finding Nemo in which the diver sucks up a specimen with a vacuum

Goals & Objectives

Students will:

- Summarize the historical development of scientific theories and ideas within the study of physical sciences.
- Apply principles of force; in this case the force and use of a vacuum.

ASSESSMENT

- 1 Hypothesis with reflection for participation, research work.
- 2 **Answers to the following questions:**
 - a How can you create quieter spaces by subtracting something?
 - b When is a vacuum stronger than a group of horses?
 - c Where does the movie Finding Nemo give a lesson in vacuum pump

ACTIVITIES

- 1 Pass out one paper cup per student.
- 2 Ask students to place the cup over their mouth, so that their lips are completely encircled.
- 3 Then ask them to inhale through their mouths and let go of the cup. (Students should be able to hold the cup magically without any hands.)
- 4 Ask students what held the cup up. (Vacuum.)
Have students to create a list of common items that use a vacuum, and then to hypothesize in writing how strong a vacuum could be and what it could accomplish.
- 5 Show the movie clip as a way to generate ideas.
- 6 Show students the vacuum pump and demonstrate how it removes matter from a space. Blow up balloons to various degrees and have students “vacuum” the air from them.
Note any remarkable results. (Balloon turning inside out.) Attach the pump to a bell jar with a ringing timer inside. Note that as students create a vacuum in the jar, the sound diminishes
- 7 Ask students how long people have known about using vacuums.
- 8 Assign students to research Otto Von Guericke. They must do a short bio, summarize his discovery, tell what time period this occurred, and report any mathematical equation they find or principle of force. Next, students must research where vacuums are used commonly today. They could look in the automotive industry, or the construction industry for starters. More advanced students could be asked to suggest a new idea for use and sketch a prototype.
- 9 Have students reflect on their hypothesis assignment. How accurate were they?

Note

It is always best to DO an experiment ahead of time to be able to best present it to the class.

