

### 8.3.3 Resource Sheet - Vacuums

#### Reading

Guiding Question: Is a vacuum a medium?

vac·u·um

*/ˈvæk, yoo(ə)m/*

noun

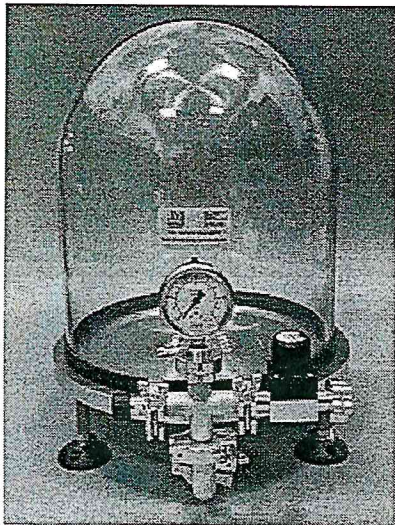
1. a space entirely devoid of matter.

*synonyms:* emptiness, void, nothingness, vacancy, absence, black hole  
"people longing to fill the spiritual vacuum in their lives"

## WHAT IS A VACUUM?

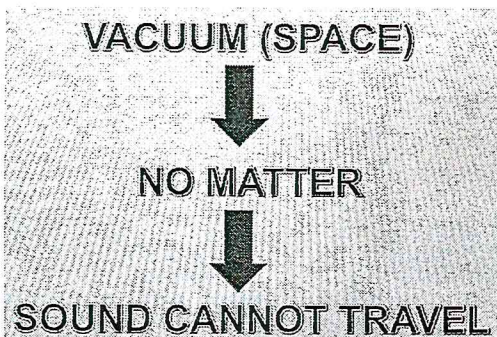
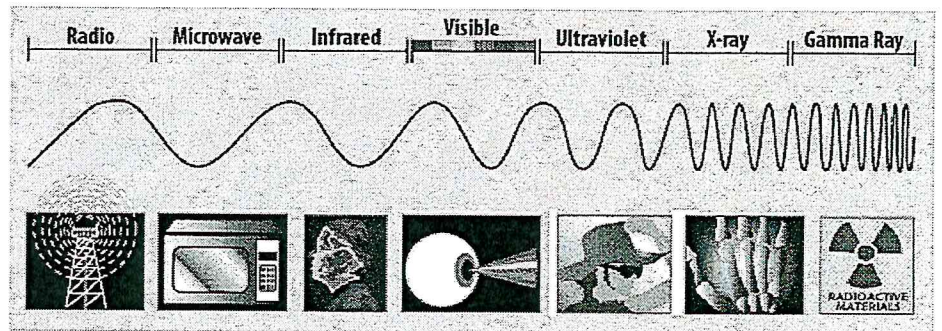
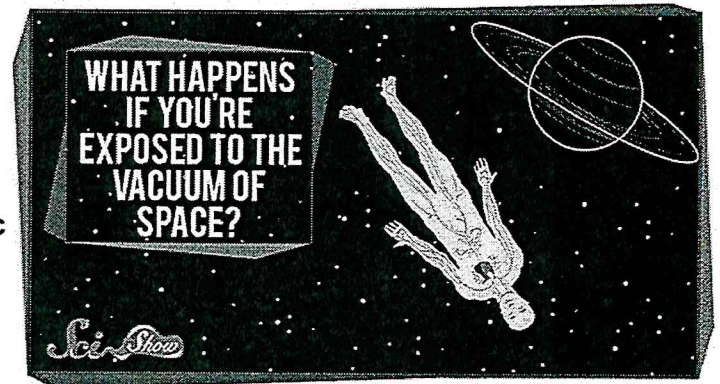
A vacuum is an area in with little or no matter of any kind. In a vacuum, there are incredibly small amounts of molecules, atoms, or particles. A complete and absolute vacuum does not exist in nature. However, the emptiness of deep space and the universe come very close to a perfect vacuum with only tiny amounts of hydrogen atoms.

We can create vacuums in the laboratory by completely removing gas molecules from an airtight container using a vacuum pump (see image to the



left). All **electromagnetic waves**, such as those shown in the image below, do not need a

medium or matter to travel and can travel through a vacuum.



In a vacuum, there is not enough matter or particles to vibrate and help transport **mechanical waves**. Sound waves, like all mechanical waves, cannot travel through a vacuum or outer space because of the absence of a medium, or matter.