8.3.3 Resource Sheet - Vacuums

Reading

Guiding Question: Is a vacuum a medium?

vac·u·um
/ˈvakˌyo͞o(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"

Task: You and your group will complete a short reading on vacuums. Using the information you have gathered from the reading, you will construct a claim supported by evidence responding to the question: Is a vacuum a medium.

Task Steps:

1. Re-read / consider the **guiding question** and share your ideas and thoughts with your group. (2 min)
2. Create a graphic organizer in your notebook containing the following information:
   a. **Guiding Question:** Is a vacuum a medium?
   b. **Claim:** Your response to the question
   c. **Evidence:** Facts and information that supports your claim
3. Read the short article "What is a Vacuum?" out loud in your team. **Rotate around the team, each student reading one sentence then rotating.** (5 min)
4. Once your group has completed the reading, search for evidence that helps you respond to the guiding question. Fill out the graphic organizer in your notebook together as a team. (5 min)
5. **Be prepared to share out if you are called on during the Whole Class Discussion.**
6. **Extra time?** What happens if a person is exposed to the vacuum of space (without a spacesuit)? Discuss your ideas with your group.

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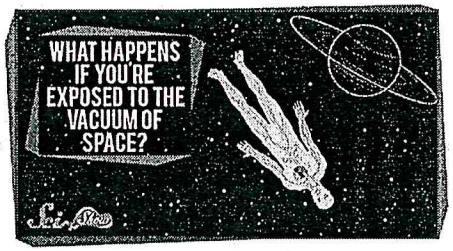
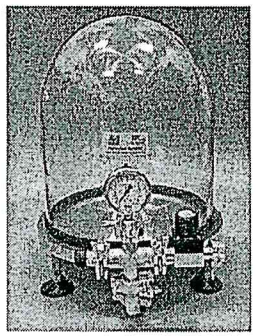
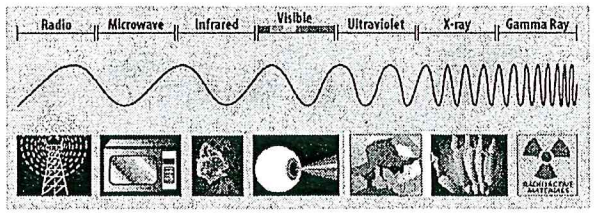
WHAT IS A VACUUM?

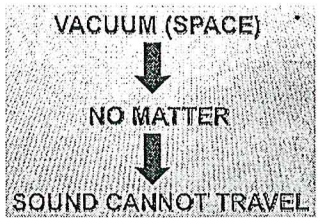
A vacuum is an area in with little or no matter of any kind. In a vacuum, there are incredibly small amounts of molecules, atoms, or particles. A complete and absolute vacuum does not exist in nature. However, the emptiness of deep space and the universe come very close to a perfect vacuum with only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