

How Can Humans Survive in Space?

Project Introduction

Space is a hostile environment. On planet Earth, we have oxygen, water, and warmth. Earth also supports a balanced ecosystem with plant and animal species that provide us with food. Space research experts have not found anywhere in space that provides any of these commodities that are vital for human life. So how can we survive in the harsh environment of space?

Topics to Be Covered

- Human body
- Environment
- Factors needed to sustain life

Objective

Students will discover what humans need to survive in space. They will also begin to understand what is necessary for human space exploration.

Classroom Time

Five to ten hours, depending on the number of groups presenting.

Materials Required

Computers with access to the Internet and a printer. You will also need a poster board or access to computer-based presentation tools such as PowerPoint.

Lesson Starter

Ask your class how humans can survive in space. Where would your food come from? What do your bodies need to survive? What happens when you get sick? Also, think of what is known about space. Explore with your class the things you use every day and how they might help you to survive in space.

Lesson Development

Each group should discuss and identify key points of interest, such as a particular way of supporting life, and conduct further research into one of them. Each group should record the key points of their discussion in the table. Students could use the Internet and books from the library for their research. You may also want to reach out to your community to find local engineers and scientists with practical experience.

Students should present their potential solutions on the topic they chose for helping humans to live and work in space. If a group chose food as their primary topic, they could research different ways food can be produced or stored to provide for a long-duration space mission. They might want to think about the sort of foods they like to eat and how they could be stored or prepared in environments where there is low or zero gravity.

Final Presentation

The students need to develop a poster on which they present the outcome of their discussion. Perhaps there are four or five related topics that they could break out and highlight on the poster. They can also explain their research and answer questions from their class on challenges and solutions.

Students need to make their presentation as a team, making sure each team member has a role. The presentation should include an explanation of how their solution will extend and sustain human activities in space.

Wrap-Up Discussion

Students should be encouraged to participate with their classmates in a group discussion about the topics each group researched. They might like to think about other ways we might be able to solve the challenge of extending and sustaining human space activity.

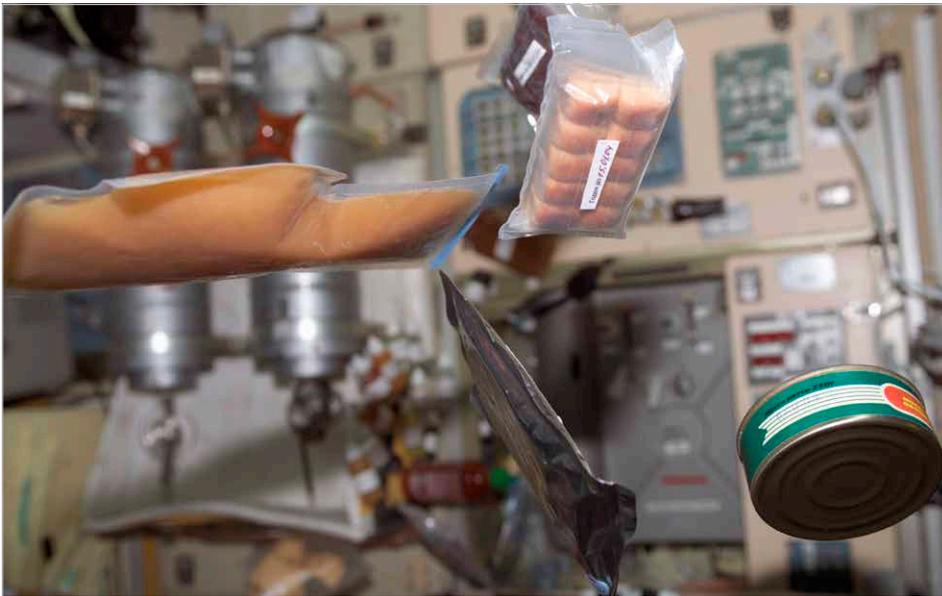
Supporting Resources

You can direct the students to NASA eClip™, which may be found under the Education section of www.nasa.gov. There students will find a wealth of topic-related videos.

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Maybe you've been on a long trip with your parents, your friends, or your school. You probably had to sit for a long time in the same seat, with only a few breaks at a service station to have some food or use the bathroom. But what if you had to travel in the car or bus not for hours, but for days, weeks, or even years?



What you need to imagine in this exercise is how you would live inside a space capsule or a space station that was no bigger than your parents' car or a bus. If you were in space there would be no gravity, so you'd float around. But that's not your biggest problem. What would you drink? What would you eat? How would you go to the bathroom?

And there's a final thing to think about. In space, there is no air. And no air means no oxygen. So what would you breathe if you stepped outside your space capsule?

So how can humans survive in space? And how can we get the essential things that we need to survive?

Discussion

Start off by thinking about living in space. This means you will need to think about where your food would come from and what your body needs to survive. What would happen if you felt ill? Also, think about the things you use every day. Would they help you to survive in space or would you have to leave them behind?

Making Your Presentation

In groups, start talking about what you might need to survive in space. Consider things like air, food, water, and lots of other things you might think of. Pick one that you feel is essential for human survival in space. When you have thought of one, talk about some of the things it involves. Write out what you have talked about in the table.

After your discussion, you can do some research. Use your school library to find out more about your chosen item and about what is needed to live in space, or find out more by searching the Internet.

After doing your research, present it as a poster. You might want to think about putting your chosen item in the center and having your different ideas extending from it. Remember to say why you have chosen it and what you think its importance is. Present your poster and your findings to the class and then try to answer their questions. Is there anything that you have missed or changed your mind about? Why?

Final Discussion

By now, you should all have thought about how you could live inside that tiny capsule or a space station. Have you found out about what you'd eat and drink while you were there, or about how you'd go to the bathroom? Maybe there is something that you found out that nobody else thought of.

Why not finish off with a group discussion about all the topics that each group found out more about? If you all managed to identify the key things that you need to survive in space for a long period of time, then maybe you'd all like to think about how even longer missions that take many months or years could be accomplished. Based on your research, what do you think might be the benefits? What are some of the problems that they face?