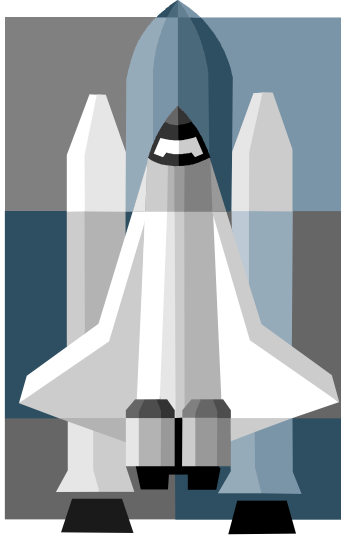




Demo
Space Freeze I: Cryogenics

Pre-Visit Activities
Grades K-2



Developed 11/06

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Standards of Learning

The following Standards of Learning are addressed in the Space Freeze I:
Cryogenics Program:

Science

1.1- The student will plan and conduct investigations in which:

- differences in physical properties are observed using the senses and simple instruments to enhance observations (magnifying glass)
- Inferences are made and conclusions are drawn about familiar objects and events
- Predictions are made on patterns of observation rather than random guesses

- Simple experiments are conducted to answer questions

Standard 2.1- The student will plan and conduct investigations in which:

- observations are repeated to improve accuracy
- observations are differentiated from personal interpretation, and conclusions are drawn based on observations
- conditions that influence a change are defined
- unexpected or unusual quantitative data are recognized

Standard 2.3- The student will investigate and understand basic properties of solids, liquids, and gases. Key concepts include:

- mass and volume
- processes involved with changes in matter from one state to another (condensation, evaporation, melting, freezing, expanding, and contracting)

Activities

These activities are intended for use before your visit to the Virginia Air and Space Center. It is beneficial for the students to have some prior knowledge about the content area covered in the program. All of the activities can be tailored to your specific classroom needs, and procedures listed are suggestions for teaching.

Activity 1: Headed for Outer Space

For this activity you will need to print out a copy of the space suit coloring page for each one of your students. They will also need crayons so they can color them.

As your students begin coloring their astronaut, ask them, “Why is this astronaut wearing a space suit?” The astronaut is wearing a space suit to protect himself from the harsh space conditions. Ask them, “If we were all going to take a trip to outer space would we want to be wearing a space suit?” Of course we would. Then ask, “Can anyone explain to me what some of the conditions are like in space?”

This is a list of conditions you may want to cover:

-Lack of oxygen

*Have all of your students take in a deep breath of air. Then ask “Will our space suit need to supply us with oxygen in outer space?” Yes it will.

- Severe cold and hot temperatures

*In outer space the temperatures are very extreme. In the sun’s light it is really hot, and in the shade where no sun light hits, it is really cold. Ask your students, “Do we need a space suit that will control our body’s temperature in outer space?” Yes we do.

-Lack of air pressure

*Explain that air is pushing in around us at all times, but in outer space there is no air pressure. So if we were to go into outer space without a space suit the lack of air pressure would cause our body serious damage. So that is why we also need a space suit to protect our bodies from the lack of air pressure.

-Lack of gravity

*Explain that gravity is the force that keeps us on the ground. Without gravity we would be flying all over the place. So in outer space when astronauts need to do work outside the space shuttle, their suits have a long secure line that attaches them to the space shuttle for protection.

Your students may come up with other conditions that are controlled by a space suit. Discuss them all. Explain that a space suit has many functions. Then ask, “How did scientists know what kind of materials to use to make the space suit?” “How did they know that these materials could withstand the severe temperatures of space?” They performed many experiments to test all of the materials. “Would you want a space suit made out of the cotton material your t-shirt is made from?” NO you wouldn’t because that material would burn up in a second. Scientists tested tons of materials like metals, rubber, glass, etc. to see what things could withstand such harsh conditions. They also did the same with the materials used to engineer a space shuttle. Throughout your discussion with your class, list all the functions of a space suit. As you go along, you can have your students list these items on their coloring sheet as well.

Extension: Create a discussion about the International Space Station. What kind of things do the people living there need to survive? Also talk about satellites and radios. How does earth communicate with space shuttles? How do the astronauts working outside the shuttle communicate with people inside the shuttle?

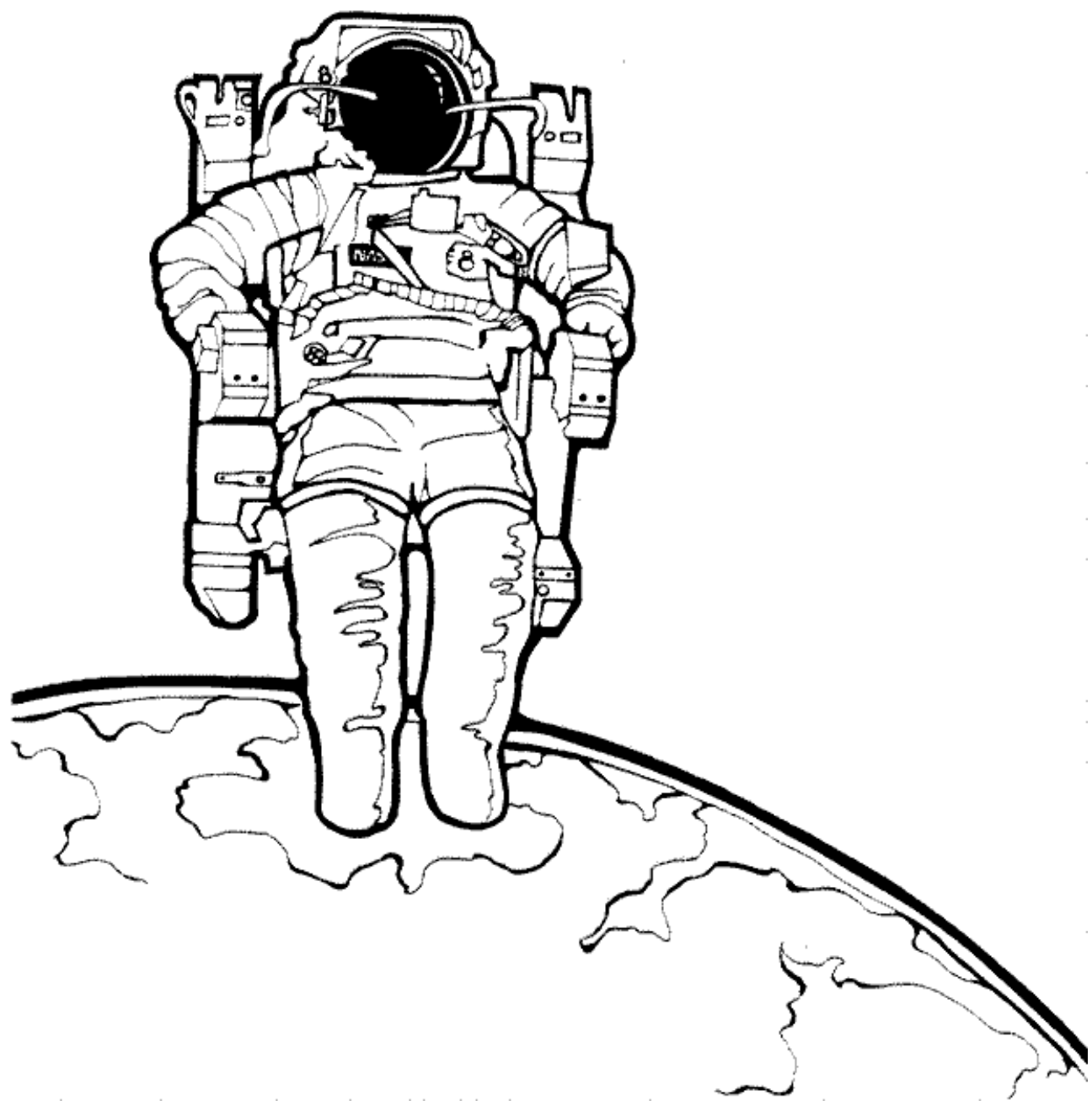
Activity 2: Safety Gloves and Goggles

The Space Freeze demonstration that your class will be attending at the Virginia Air and Space Center tests different materials for durability to severe cold temperatures using liquid nitrogen. Handling liquid nitrogen can be very dangerous if the proper safety procedures are not followed. This activity is to educate your students on experiment safety before they come to the center.

Prep- If you have a set of safety gloves and goggles you can show your students, that would be great. Have a chalkboard or dry erase board near you so you can list the items discussed on the board.

Explain to your students that scientists and engineers have the important job of determining what materials can be used to build everything around us. When you go to the Virginia Air and Space Center, you will actually get hands on experience testing some materials. Ask your students, "If we are going to be conducting some experiments, what kind of safety gear do you think we will need?" "Can we put materials into a container of severely cold material with our bare hands?" No, we need safety gloves to protect our hands. "What about our eyes?" "What if something were to "pop up" out of the container?" "Would we want it to get into our eyes?" No, we need safety goggles to protect our eyes. "What if we are just sitting in the audience watching and something accidentally jumps out towards us?" "Do we pick it up with our hands?" No we don't want to touch it because it could hurt us. Explain that most experiments are done under a controlled setting. A controlled setting means that all the materials and procedures have been thoroughly planned out so that everything is safe and nothing is interfering with the findings. Explain that safety is always top priority. Always have an adult around when doing experiments.

Extension: Have the students experiment with temperature. Take several containers of water. One with ice water, one with luke warm water, and one with hot water. Have the students practice reading the thermometer in Fahrenheit and Celsius.



Resources

WEBSITES

http://www.chem4kids.com/flies/matter_intro.html

http://www.cosmos4kids.com/flies/universe_vacuum.html

http://www.biology4kids.com/flies/studies_sciethod.html

<http://www.pbs.org/teachersource/>

BOOKS

IT'S SCIENCE SOLID, LIQUID, OR GASES? Sally Hewitt. 1997.

Solids, Liquids, and Gases. Ginger Garrett. 2004.

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