



Design A Spacesuit!

Subject: Science

Grades: 4th-7th

Lesson Duration: 60 minutes

Rational or Purpose: For the students to consider properties/characteristics of space (function of suit and needs while in space, temperature, pressure, lack of oxygen, etc.) and use these as rationale for a unique spacesuit design. Also students will develop skills in discussion and comparison as they formulate their ideas, and there is opportunity to integrate a technology component (see links in Resources). Creativity is promoted in the design process, and in the use of recyclable/reusable supplies used for construction materials, and in the sales pitch written for NASA on why the organization should choose to use their new design for the next space mission. Modification opportunities to be made as large and complex (such as going into the history of human space exploration or future career opportunities) or simple as needed abound. Student artifacts would be great on display!

Materials needed: (amount varies depending on teacher's choice of whether students should work alone or in groups)

- Computer with internet access, books, and other materials for space research
- Picture of current space suit
- Recyclable/reusable materials (old towels, utensils, bottles, buttons, cotton balls, string, etc.)
- Poster or paper for design of sales pitch

TEKS:

§112.6. Science, Grade 4, §112.7. Science, Grade 5, Beginning with School Year 2010-2011

(1) Scientific investigation and reasoning. The student conducts classroom and outdoor investigations, following home and school safety procedures and environmentally appropriate and ethical practices. The student is expected to:

(B) make informed choices in the use and conservation of natural resources and reusing and recycling of materials such as paper, aluminum, glass, cans, and plastic.

(2) Scientific processes. The student uses scientific inquiry methods during field and laboratory investigations.

The student is expected to:

(D) analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence;

(F) communicate valid conclusions in both written and verbal forms; and

(3) Scientific processes. The student knows that information, critical thinking, and scientific problem solving are used in making decisions. The student is expected to:

(B) draw inferences based on information related to promotional materials for products & services;

(C) represent the natural world using models and identify their limitations;

(D) connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.

§112.18. Science, Grade 6, Beginning with School Year 2010-2011.

(11) Earth and space. The student understands the organization of our solar system and the relationships among the various bodies that comprise it. The student is expected to:

(C) describe the history and future of space exploration, including the types of equipment and transportation needed for space travel.

§112.19. Science, Grade 7, Beginning with School Year 2010-2011.

(9) Earth and space. The student knows components of our solar system. The student is expected to:

(A) analyze the characteristics of objects in our solar system that allow life to exist such as the



proximity of the Sun, presence of water, and composition of the atmosphere; and
(B) identify the accommodations, considering the characteristics of our solar system, that enabled manned space exploration.

Background Information:

Spacesuits protect astronauts from the hazards of space and have gone through considerable changes throughout the history of man's space exploration. In space, there is no oxygen for respiration, there is little or no air pressure, and there are extreme changes in temperature (from -100°C to 120°C), just to name a few of the variables that spacesuit engineers face. Spacesuits also have to be designed to allow for movement and function for the astronauts who need mobility for space station repairs, etc.

Activity:

Students will be able to use computers with internet access to extract information regarding properties and characteristics of space, design and construct a model of a spacesuit using these considerations, and compare designs through a sales pitch for their space suit.

Procedure

1. Have students organized into groups of four. Tell the students that they will be researching using the computer to find out about the history of space suits.
2. Each group will be considering the factors that engineers take into account when designing suits, and will use these considerations to design their own.
3. Once the design has been made, a model suit will be constructed using recyclable materials. Parts of the suit should be identified with labels that also describe the purpose of that part. This is particularly important for parts that the students invented as a brand new consideration for their spacesuit.
4. Students will then make an advertisement poster that tells NASA why their spacesuit design is perfect for the next manned space mission.
5. Then groups can present their spacesuit and poster to the class.

Questions to ask the class:

1. Which parts of the spacesuits you researched did you consider the most important? Explain your answer.
2. How have spacesuit designs and considerations changed over time? Why did these changes take place? Did ideas or understandings change? Explain your answer.
3. In designing your spacesuit, did you consider any variables that were new that you have not seen in previous designs? Describe your changes.

Resources:

***Technology Component: Check out the clickable space suit and learn about the different parts of a spacesuit and take a look at spacesuits of the future!

http://www.nasa.gov/audience/foreducators/spacesuits/home/clickable_suit.html

Research History of the Space Suit: <http://www.fi.edu/pieces/hiley/history.htm>
<http://web.mit.edu/16.00/www/aec/spacesuit.html>

Variation on teacher lesson plan from: www-saps.plantsci.cam.ac.uk/docs/p4pp/ralc2/snipseed.pdf