

Mission Patches

Objective: To report on a space mission and draw the mission patch.

Grade Level: 5-8

Subject(s): Science, History, Art,
Technology

Prep Time: < 10 minutes

Duration: Overnight/Extended

Materials Category: Classroom

National Education Standards	
Science	6a, 6b
Mathematics	
Technology (ISTE)	6, 7, 10
Technology (ITEA)	
Geography	

Materials:

- Research materials
- Computers with Internet access
- Markers, crayons, colored pencils, etc.
- NASA Mission patch examples
- Unlined paper

Related Links:

NASA Mission Patches

http://www.hq.nasa.gov/office/pao/History/mission_patches.html

Mission and Patch Information

<http://spaceflight.nasa.gov>

ShopNASA.com—Johnson Space Center Gift Shop

<http://www.shopnasa.com/>

Supporting NASAexplores Article(s):

Space Suits On Parade

http://www.nasaexplores.com/show2_article.php?id=02-028



Mission Patches

Teacher Sheet(s)

Pre-lesson Instructions

- Place students into pairs.
- Schedule computer time for groups to research their missions on the Internet.
- Read the 5-8 NASAexplores article, "Space Suits On Parade."
- NASA patches can be purchased online or at any NASA Center gift shop. Samples can also be found and printed from the Internet.

Background Information

Mission patches have become a part of every manned spaceflight mission. Today's astronauts launch with patches of their own design sewn on the suits to represent the objectives and goals of their missions. This wasn't always the case. The Mercury astronauts launched with only the NASA insignia sewn on their suits. The Mercury patches we see today were made after the missions to commemorate the flights. The first flight to use a patch in addition to the NASA patch was Gemini IV. This flight crew wore an American Flag patch on the shoulders of their pressure suits. This patch has become a permanent addition to all pressure suits worn by American astronauts.

The crew of Gemini V created the first crew-designed mission patch to be worn in space. This began the trend of mission patches being created to represent the crew's mission and to personalize their flight. Each crew works together to come up with a rough idea for the design of the patch. This idea is then given to a graphic designer to finalize the design and create the final images that will be made into a patch. The patches are then worn on the right chest of the space suit, below the astronaut's nameplate.

Guidelines

1. Demonstrate and share two or three mission patches. Describe some of the mission details, and explain the symbolism of the patches.
2. Divide students into pairs.
3. Assign each group a manned mission, and have students research the details of the flight. They should look for objectives, goals, highlights, etc. Here is a list of missions to get you started:
 - Mercury – Freedom 7, Liberty Bell 7, Friendship 7
 - Gemini V, Gemini VI, Gemini IX-A, Gemini XII
 - Apollo 8, Apollo 9, Apollo 10, Apollo 11, Apollo 13
 - Skylab 3
 - Shuttle – STS-1, STS-7, STS-90
4. Have students find and draw the mission patch from their particular mission.

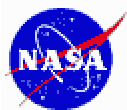


Discussion / Wrap-up

- Have students share their patches with the class and explain the meaning behind the symbols present in their patches.

Extensions

- Have the groups design their own mission patch, using appropriate symbols, for a mission that would take them to another planet.



Mission Patches

Student Sheet(s)

Materials

- Unlined paper
- Markers, crayons, colored pencils

Procedure

1. Working with your partner, search for information about the space mission you have been assigned.
2. Search on the Internet to find the mission patch design from the mission.
3. Make a drawing of this mission patch, and write a short paragraph explaining the symbolism of the patch.
4. Share your findings with the class.

Related Links

NASA's Official Web Site

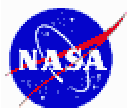
www.nasa.gov

NASA Spaceflight

<http://spaceflight.nasa.gov>

NASA Mission Patches

http://www.hq.nasa.gov/office/pao/History/mission_patches.html



Space Suits On Parade



You'll probably never see a fashion show runway with astronauts displaying the latest styles in flight suits. Trends in space gear don't often make front-page news, but over the years, significant improvements have been made. Unlike popular fashion, the modifications made to flight suits and space suits are much more practical than style driven.

Astronauts wear more than one uniform.

The flight suit is worn on the ground; it's a cloth jumpsuit that provides little protection. Flight suits are more closely aligned with uniforms than with space protection gear. As space travelers board the Space Shuttle to prepare for launch, however, they wear bright orange launch suits, or partial pressure suits. During the launch and entry phases of flight, these suits have a parachute harness assembly and a parachute pack, as well as helmet, communication assembly, torso, gloves, and boots. The suit provides protection from the changes in pressure and temperature extremes that the crew could face if it must parachute to safety. Without the suit pressing on the abdomen and legs, the blood would pool in the lower part of the body and cause the astronaut to black out as the spacecraft returns from microgravity to Earth's gravity. This suit could also support a crew member in a life raft for 24 hours without danger of exposure.



During orbit, whether working on the Space Shuttle or International Space Station, astronauts do not wear special uniforms. They work in flame-retardant civilian clothes because the pressure and temperature in these space environments are controlled. When they venture out of the craft's protective walls, however, astronauts change into the extravehicular mobility unit (EMU), better known as a space suit.

Over the years, EMUs (space suits) have changed significantly. The current suits feature a primary life support system and several other special items designed for comfort and safety as space walkers brave the new frontiers. Space suits are made of components that can be mixed and matched to accommodate the many sizes of astronauts that go into space.



To prepare for a space walk, the astronaut goes into the airlock and puts on several unique parts of the EMU including:

- A urine collection device that receives and stores urine for transfer later to the waste management system
- A one-piece liquid-cooling and ventilation garment that has water-cooling tubes running through it to keep the wearer comfortable during work periods
- An in-suit drink bag containing 21 ounces of drinking water
- A communications carrier assembly with headphones and microphones
- A biomedical instrumentation subsystem to monitor the astronaut's vital signs



The space suit is rigid, but it has jointed sections to allow for movement. The upper and lower torso sections are put on separately and connected to allow circulation of water and gas lines. Gloves and helmet are added to create a sealed protection against meteoroids and radiation. A basic space suit weighs about 100 pounds on Earth, but far less in reduced-gravity conditions, and should last 8 years under normal conditions. Space suits are white because that color reflects

heat most effectively.

The primary life support system (PLSS) is a permanently mounted backpack that attaches to the upper torso of the suit, with displays mounted on the suit chest. The backpack unit supplies oxygen for breathing, suit pressurization, and ventilation. The unit also cools and circulates water used in the ventilation garment, controls ventilation gas temperature, and absorbs carbon dioxide.

When astronauts walk in space, the manned maneuvering unit (MMU) latches to the PLSS. This “jet pack” allows an astronaut to fly in and around the vehicle, cargo bay, or nearby structures.

They’ve Come A Long Way



The first space suits used on the Mercury spacecraft were modified versions of Navy high-altitude jet aircraft pressure suits with an inner layer of Neoprene-coated nylon fabric and a restraint layer of aluminized nylon. Because the astronauts stayed inside the craft at all times, space walking needs were not considered. The suits could be pressurized if needed in the event of a cabin pressure loss.



When Edward White opened the Gemini IV hatch and became the first American to walk in space, a 25-foot oxygen line attached to a chest-mounted pressure regulator and ventilation assembly supported him. It worked, but as space travel progressed, so did the design of space suits.

Landing on the Moon meant that astronauts needed to be fully independent from the spacecraft. A self-contained supply of breathing and pressurizing oxygen, filters for removing carbon dioxide, and cooling water, mounted in a backpack system, gave Apollo crewmen the independence they needed.

Apollo suits featured greater mobility and flexibility for walking on the Moon's surface and riding in the lunar buggy, greater comfort for the wearer, and greater protection from Moon rocks, meteorites, and high heat.

The Suit Of The Future

NASA continues to explore new ideas in space suits. The suits of the future will be designed for comfort, mobility, range of motion, and flexibility. Suits must protect astronauts from radiation, micrometeoroids, and manmade debris, and allow the wearer to breathe in comfort and safety. Current space suits require a prebreathing procedure to adapt the body for the space walk; future designs may increase the pressure to require less prebreathing time.



*Courtesy of NASA's
Human Exploration and Development of Space Enterprise*

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