STAR TREK LIVE
STARFLEET ACADEMY

Mad SCIENCE

SCHOOL MATINEE PERFORMANCES

Wednesday
November 3, 2010

9:30am & 12:30pm

$6 per person

Approximately 60 minute shows
Recommended for students
in grades 3—7

Alberta Bair Theater
for the performing arts

ALBERTA BAIR THEATER
2801 Third Avenue N
PO Box 1556
Billings, MT 59103
Ticket Office: (406)256-6052
Executive Office: (406)256-8915

ABT Education Staff
Adam Sundstrom
Interim Education Director

www.albertabairtheater.org

SYNOPSIS

Where did it all begin?
The Science of STAR TREK LIVE!
and Space Exploration

NASA and *Star Trek* have a long, parallel history together. *Star Trek's* final, original series episode aired in June 1969. One month later, NASA's *Apollo 11* astronauts, Neil Armstrong and Edwin Aldrin (Buzz), landed on the Moon while their fellow crewmate, Michael Collins, remained in lunar orbit. NASA's missions are to gain a better understanding of our planet and to explore our solar system as well as the universe.

Star Trek's missions have similar objectives, to explore strange new worlds and seek out new life. The effect of *Star Trek* has transformed science-fiction into science-reality. One of NASA's first space shuttles was named the *Enterprise* in honor of the show's premier starship. Numerous real-life astronauts have played roles on the television series.

The original *Star Trek* show is set in the 23rd century. Their technology is even more advanced than our 21st century abilities, yet it sparks our interest in developing such possibilities. The *Star Trek* world introduced science-fiction devices that are now true sciences; *combadges* and *tricorders* are equivalent to modern day cell phones and medical scanners. *Star Trek* has successfully given a sense of science to science-fiction, and NASA has made that possible!

For more information regarding *Star Trek Live!, please visit* www.madscience.org

Star Trek Live!

Mad Science presents Star Trek Live, an out of this world, interactive adventure based on the most popular science fiction franchise (Star Trek) of all time!

Eager to learn from Starfleet's best and brightest, our students gather anxiously awaiting their first day at the Academy. As we are introduced to the Academy, the Earth itself comes under attack from a rebel Romulan, leaving the fate of the future in the hands of our cadets.

Cadets will have to quickly learn the the complexities of living and working in space, modern space travel and the latest in communication and technology as they look to the achievements of science of the 21st century. It will require all of our knowledge, quick-thinking, common sense and passion for exploring science to discover what is happening and how to set things right before it's too late!

Get ready for an 'out of this world' experience!

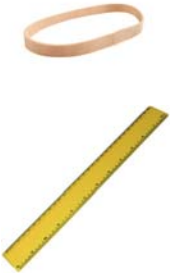
EXPERIMENT: Space Spine Stretch

Try this simple and fun experiment with your students to demonstrate how the human spine reacts in microgravity. This is a great hands-on activity to get students ready for their outer space journey!

Basic Information

Estimated time: 10 minutes





Materials:

- 15 soft rectangular sponges
- 20 pocket-sized books
- 6 large rubber bands to fit around a stack of books
- 6 rulers

Instructions

1. Ask the students to hypothesize why astronauts in space might grow taller.
2. Divide the class into groups of five. Give each group three sponges, four books, one rubber band and a ruler.
3. Have the groups layer the books and sponges alternately to make a stack. Explain that the stack represents our spines. Our hard vertebrae, the bones in our backbone, are the books. The intervertebral discs, the soft material between them, are the sponges.
4. Instruct a group member to press down on the stack, while another student fits the rubber band around the stack. Inform them that the rubber band illustrates the force of gravity compressing the discs in the spinal column when the astronaut is on Earth.
5. Have the groups measure the height of the books and sponges (“spine”) when gravity is present.
6. Instruct a student to remove the rubber band while keeping the stack upright. Explain that this represents an astronaut’s spine in space that is not affected by gravitational force. We call this environment-type, microgravity. Have the groups use a ruler to measure the stack.
7. Ask for observations and conclusions. Have students list other ways microgravity would affect an astronaut’s life.

EXPERIMENT: Space Spine Stretch

Try this extension of the Space Spine Stretch experiment

Measure students in the morning and at the end of the day. Students will find that they are taller in the morning. Our spines lengthen at night while we sleep and they compress when we are upright all day.

Explanation:

This activity demonstrates how an astronaut's height changes in space. The book and sponge, or the "spine", is taller without the rubber band's compression. Removing the rubber band allows the books and sponges to expand. Gravity's downward force on Earth compresses the soft material between our vertebrae. This pulling force is what makes us a certain height on Earth.

We say astronauts in orbit are in a free-fall. Earth's gravity pulls on the astronauts and also on their spacecraft. The astronauts and the spacecraft fall at the same rate continuously "falling" in their orbit. An environment in free-fall is a microgravity environment. Astronauts in free-fall do not feel gravity which allows the soft material between the vertebrae to expand, making astronauts temporarily taller. Amazing!!!

FUN FACTS

- Astronauts need to hold on to one another while talking so they don't float away!
- The personal safety mascot for NASA is the cartoon character, Snoopy.

Teacher Review
Reflecting with Your Students After the Show

"It is often *after* the show that the real learning begins. You and your class have shared an experience—and it's in reflecting on the experience together that you will learn the different kinds of responses the show elicited. Sharing these responses gives students opportunities to learn about things that they didn't see or hear. It helps them broaden their perceptions and hone their evaluative skills, cementing what they themselves think."

Name of performance attended: _____

School name: _____Teacher: _____Grade level: _____

How helpful was the study guide in preparing your students for the performance?
Very _____ Some _____ Not at all _____

How helpful was the study guide in giving you classroom activities you could use?
Very _____ Some _____ Not at all _____

Any other comments about the study guide? _____
_____

Please let us know what the impact of the performance was on your students:
_____
_____
_____

In what ways did the performance connect to the classroom?
_____
_____
_____

Were you satisfied with your overall experience at the Alberta Bair Theater?
Very satisfied _____ Somewhat satisfied _____ Not satisfied _____ Indifferent _____
What improvements could be made?
_____
_____
_____

Please mail: Alberta Bair Theater, Education Dept., P.O. Box 1556, Billings, MT 59103
or FAX: (406) 256-5060

Student Review Form

Student Name _____School _____ Grade ____

Name of Performance_____

What type of art form did you see onstage? (Theater? Dance? Music? Was there a combination of forms?)

What did you like or dislike about the performance? How did it make you feel? (Energized? Inspired?)

What did you learn from the performance? (Did it spark any new ideas?)

Was there a section of the performance that you particularly liked or disliked? If so, why?

What 4 adjectives would you use to describe the performance or the performers?

Please mail or deliver to:
Alberta Bair Theater, Education Dept., 2722 3rd Ave N #200, Billings, MT 59101