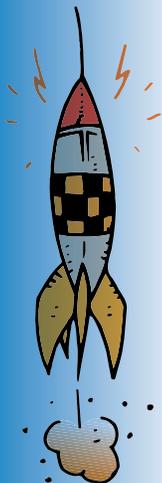




Volume 5  
Issue 3

# Learning to Walk...in Space!



Space walks, or what NASA calls extravehicular activity (EVA), are a very important part of many space missions. When astronauts need to go outside the Space Shuttle or International Space Station, they have to put on a special suit that acts like a personal space-craft. The EVA suit provides pure oxygen for the astronauts to breathe, and is cooled with a special suit underneath that can have cool water circulating throughout it. During an EVA, astronauts can be in these suits for up to 10 hours.

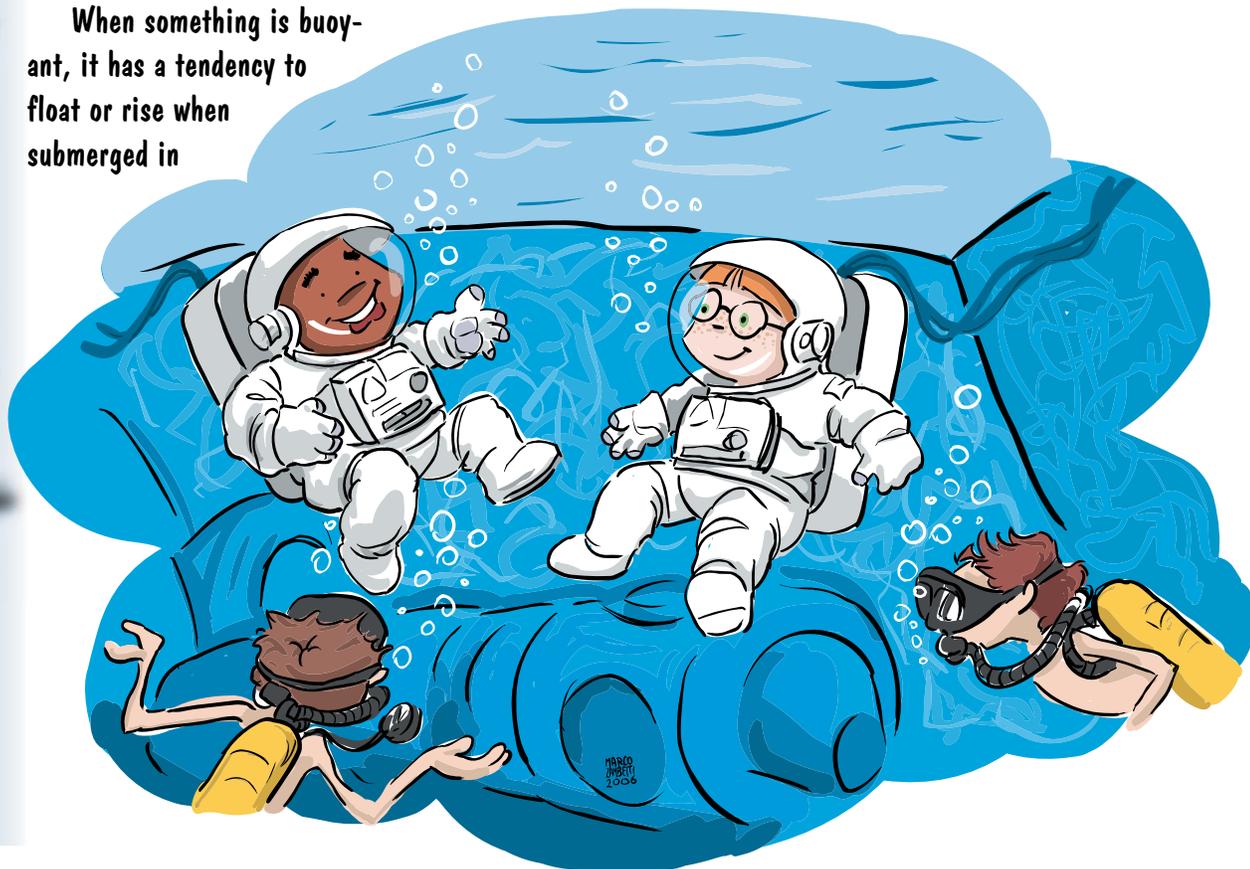
To train for doing EVAs, astronauts need a place that simulates the space environment where they can wear their EVA suits. The Neutral Buoyancy (boy-un-see) Lab is a giant swimming pool for diving that allows astronauts to train for space missions involving space walks. Full-scale models of the International Space Station and Space Shuttle are at the bottom of the 40-ft pool, and there is even a mission control center that directs the activities of the dives.

When something is buoyant, it has a tendency to float or rise when submerged in

water. What does it mean to be neutrally buoyant? It means to have an equal tendency to float and to sink. When an item is neutrally buoyant, it is very easy to move the item while it is under water – much like moving an object in space.

Astronauts training in the Neutral Buoyancy Lab wear space suits similar to those used during space flight EVAs, and they breathe high levels of oxygen as they would on EVAs. Although we need oxygen to survive, too much oxygen can cause damage to cells in the body. We can measure the amount of damage by looking at chemicals in the blood and urine to see how much damage was done by the excess oxygen. Antioxidants are chemicals found in foods, such as vitamin C or vitamin E, that can reduce damage from oxygen. We are currently doing an experiment to see if antioxidants can prevent damage caused by exposure to too much oxygen and exercise while training in the NBL. One of the foods we are testing is grape juice, which is rich in antioxidants.

Space Nutrition



# Thea's Corner... Dancing Raisins

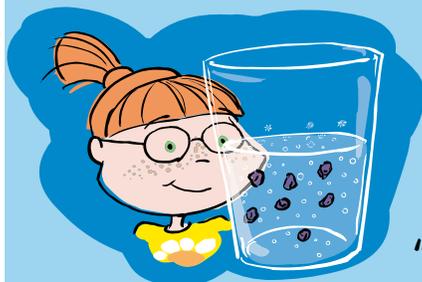
Here's an experiment you can try to demonstrate the principles of buoyancy.

What you will need:

- A clear glass
- Raisins
- Knife to cut raisins in half
- 1-2 cups of club soda (must be fresh, cannot be flat)

Procedure:

Pour the club soda into the glass. Drop in a half of a raisin and wait 20-30 seconds. What happened? Can you explain why the raisin acted the way it did?



At first, the raisin had a negative buoyancy (it sank). Then, the soda bubbles stuck to the sides of the raisin, and as a result, the raisin had a positive buoyancy (it floated). The bubbles change the buoyancy because they are less dense than water. If an object "hovers," and has an equal tendency to sink or float, it is neutrally buoyant. These principles actually explain why fish can swim around so easily!



## Did You Know?

- There are more than 326 million trillion gallons of water on Earth!
- The NBL is 202 ft long, 102 ft wide, and 40 ft deep. It holds 6.2 million gallons of water, and the water in the NBL is recycled every 19.6 hours. The water is kept at a temperature from 82 to 88 degrees.
- Colorful fruits and vegetables such as melons, grapes, peppers, tomatoes, and berries are rich in antioxidants.

## Word of the Month

### artificial

Can you guess what this word means? Look it up in the dictionary and see if you were right. We'll have more on this next month!

Web Challenge: Find out why EVA suits are white at one of the links below...

<http://spaceflight.nasa.gov/station/eva/index.html>

<http://spaceflight.nasa.gov/station/eva/spacesuit.html>

<http://scifiles.larc.nasa.gov/>

<http://spaceflight.nasa.gov/living/spacefood/index.html>



Check out Thea's Bonus Page, experiments you can try, and even stuff you may have done at our website:

[http://haco.jsc.nasa.gov/resources/kid\\_zone.htm](http://haco.jsc.nasa.gov/resources/kid_zone.htm)

email: [Space.Nutrition.Newsletter@nasa.gov](mailto:Space.Nutrition.Newsletter@nasa.gov)