

Puffy Head Bird Legs

Young Astronaut Series - International Space Station

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Teacher Information

Background Information

When astronauts leave Earth's gravity, they experience a puffy head and bird legs. With the rush of fluids to the upper part of the body that occurs in free fall, the heart has more blood to force out during each beat. To compensate for this increase in volume, the heart rate decreases. To simulate the fluid shift here on Earth, scientists use the bed rest head-down tilt method. Some studies of this type last only 24 hours, but others have lasted up to about a year. You will complete this activity to simulate the fluids shift in astronauts and notice the change in heart rates.

Materials

tape measure
pillows and a chair
paper and pencil
watch with a second hand
Puffy Heads and Bird Legs Recording Sheet (1 copy per student)

Procedure

1. Students will work in pairs.
2. One student in each pair will measure and record his/her leg size on the lower part of the leg.
3. Then, the student will measure his/her standing heart rate (beats per minute.)
4. The student being tested will lie down on the pillows with legs pointing upward, supported by a chair. Place only one pillow under the head and three or four pillows under the back to provide a tilt.
5. Every minute for 10 minutes the other student will measure and record the leg size of the student being tested. Be sure to measure at the same place each time.
6. Every 2 minutes the standing student will find the resting heart rate of the student being tested in the head-down tilt position.
7. The standing student will record observations of any changes in the face and any feelings the lying student is feeling.
8. After the 10 minutes, the student being tested should stand up slowly and carefully. Lowering the legs and then sitting for a short period is recommended.
9. He/She should rest for 5 minutes, then repeat steps 1-7 for the other person.

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Student Sheet

When astronauts leave Earth's gravity, they experience a puffy head and bird legs. With the rush of fluids to the upper part of the body that occurs in free fall, the heart has more blood to force out during each beat. To compensate for this increase in volume, the heart rate decreases. To simulate the fluid shift here on Earth, scientists use the bed rest head-down tilt method. Some studies of this type last only 24 hours, but others have lasted up to about a year. You will complete this activity to simulate the fluids shift in astronauts and notice the change in heart rates.

Objective

To collect and analyze data through a series of medical tests.

Materials

tape measure

pillows and a chair

paper and pencil

watch with a second hand

Puffy Heads and Bird Legs Recording Sheet (one for each student)

Introduction

Most robots used for exploration of other planets, asteroids, or comets rely on receiving instructions from Earth to accomplish tasks. For these robots, there is a delay between the time that controllers send instructions and the time that the robot receives the instructions. For a robot on Mars, this delay can be as much as 20 minutes. Therefore, it is important that the instructions sent be very well written. In this exercise, you will work in a group with several of your classmates to develop instructions for a robot.

Procedure

1. Measure and record the leg size on the lower part of the leg.
2. Measure your standing heart rate (beats per minute.)
3. Lie down on the pillows with legs pointing upward, supported by a chair. Place only one pillow under the head and three or four pillows under the back to provide a tilt.
4. Every minute for 10 minutes have your partner measure and record your leg size. Be sure to measure at the same place each time.
5. Every 2 minutes have your partner find your resting heart rate in the head-down tilt position.
6. Have your partner record observations of changes in your face. Also, have your partner write down your feelings during the 10 minutes.
7. After the 10 minutes, stand up slowly and carefully. Lowering the legs and then sitting for a short period is recommended.
8. Rest for 5 minutes, then repeat steps 1-7 for the other person.

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Student Data Sheet

Time: **0** minutes

Leg size: _____

Heart rate: _____(beats/min)

Time: **6** minutes

Leg size: _____

Heart rate: _____(beats/min)

Time: **1** minute

Leg size: _____

Time: **7** minutes

Leg size: _____

Time: **2** minutes

Leg size: _____

Heart rate: _____(beats/min)

Time: **8** minutes

Leg size: _____

Heart rate: _____(beats/min)

Time: **3** minutes

Leg size: _____

Time: **9** minutes

Leg size: _____

Time: **4** minutes

Leg size: _____

Heart rate: _____(beats/min)

Time: **10** minutes

Leg size: _____

Heart rate: _____(beats/min)

Time: **5** minutes

Leg size: _____

Changes in the face:

Person's feeling during the 10 minutes:
