RAFT IDEAS

Topics: Stretching, Spinal Compression, Living in Space

Materials List

- ✓ Straight edge (e.g. ruler, index card)
- ✓ Strip of paper, ~5 cm x 15 cm (2" x 6")
- ✓ Tape
- ✓ Pencil
- ✓ Measuring tape or meter stick

This activity can be used to teach:

- Structures (Next Generation Science Standards: Grade 4, Life Science, 1-1)
- Body Systems (Next Generation Science Standards: Middle School, Life Science 1-3)
- Environmental Factors (Next Generation Science Standards: Middle School, Life Science 1-5)

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Sleep Growth

You grow in height when you recline

Measure heights at bedtime and first thing in the morning to see the effect of gravity on the spine.

To Do and Notice

Note: Students measure their heights in their own homes.

1. Tape the narrow strip of paper to a door jam so that the bottom of the strip is ~5 cm (2") **below** the height of person to be measured. A door jam allows a person to get nearer to the paper strip than measuring on a wall.
2. Measure height just before going to bed at night (after having removed shoes). Student stands with back against the door jam where the paper strip is located. Helper uses straight edge to find the student's height on the paper strip and marks that height on the paper strip.
3. Upon getting up in the morning measure and mark student's height on paper strip.
4. Measure and record the difference in heights.
5. Back in class, record the changes in heights for all students. Students calculate the average difference and compare the variation between students.

The Science Behind the Activity

During the day the spine compresses due the pull of gravity, but at night while sleeping, it decompresses (stretches out). Astronauts in weightlessness experience this stretching out of the spine and become a little taller while in space. This growth must be taken into account when fitting astronauts for the space suits they will use during any Extra Vehicular Activity (EVA) or space walks. The stretching of the spine also causes back pain for a number of astronauts. When astronauts return to Earth, they once again experience the compression of the spine during the day.

Taking it Further

- As a visual model of the spine, have students look at how a spring works. How does a spring look when compressed? When decompressed? See RAFT Idea Sheet ***Bone Up on the Spine,*** for a simple model of the spine.
- Create a stable incline with a slight slope, about 6º (e.g., a sturdy table with one set of table legs propped on blocks). Measure and record students' heights before and after they lie on the incline, for at least 10 minutes, with their head lower than their feet.

Web Resources (Visit www.raft.net/raft-idea?isid=488 for more resources!)

- Effects of space on the body - www.lpi.usra.edu/education/explore/space_health/
- Physiological Effects of Weightlessness - http://library.thinkquest.org/C003763/index.php?page=adapt02

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