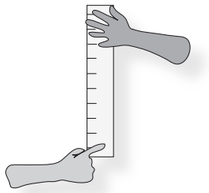
Reaction Time

Our reflexes help us stay safe and alert. Measure your reaction time with this simple activity.

Materials

- one ruler per pair of students
- a wall



2.1.8 Understand the organization and function of human body structures and organs and how these structures and organs interconnect.

2.1.2 Understand how to plan and conduct simple investigations following all safety rules.

Procedure

- Have one student place the ruler flat against the wall with the 12" side at the top, while the second student holds their finger level with the bottom of the ruler, about ½ an inch from the wall.
- The first student should let go of the ruler and the second student should try to stop it between the wall and their finger.
- The shorter the distance the ruler falls, the quicker their reaction time.

Challenge

Swap hands, does using your less dominant hand make it harder? If you practice a few times does your reaction time improve? What happens if you hold your finger farther away from the ruler?

What's going on?

Human brains are divided into many parts that all work together. For this activity you must use your occipital lobe to see where the ruler is, your frontal lobe to process how the ruler is moving, and your parietal lobe to feel the ruler.

After Image

Discover how "tired" sensory receptors play tricks on you!

1.2.1 Analyze how the parts of a system go together and how these parts depend on each other.

2.1.2 Understand how to plan and conduct simple investigations following all safety rules.

Materials

- multiple sheets of brightly colored construction paper
- a brightly lit, white wall

Procedure

- Have students stand or sit facing a white wall.
- Hold a sheet of colored paper up and have them stare at it for 30-45 seconds.
- When the time is up, move the colored paper from their sightline and ask them to continue to stare at the white wall. What do they see? Try this a few times with different colored paper.

Challenge

If you wanted to see a red after image, what color(s) would you have to stare at? How do you predict the after image would change if you put a large black circle in the middle of the construction paper?

What's going on?

There are color sensors located in the retina of the eyes called cones. Each individual cone is sensitive to red, blue or green. When you stare at a particular color for too long, the cones that perceive that particular color become fatigued. Once the color is removed from your vision you see a complimentary color because the complimentary color cones are not fatigued and are therefore collecting and transmitting information to your brain more effectively. For example, if you stare at red paper you will see blue-green when it is gone. After images typically last for less than five seconds before your vision returns back to normal.

Resources

Blood and Guts: A Working Guide to Your Own Insides, by Linda Allison, 1999

Eyewitness: Skeleton, by Steve Parker, 2000

The First Human Body Encyclopedia, DK First Reference Series, 2005

Reader's Digest: How the Body Works, by Steve Parker, 1999

The Usborne Internet Linked Complete Book of the Human Body, by Anna Claybourne, 2003

www.kidshealth.org

www.medtropolis.com/VBody.asp

www.colorcube.com/illusions/illusions.htm

www.yucky.com

www.iknowthat.com/com/L3?Area=Science%20Lab

Science On Wheels website: www.pacifivsciencecenter.org/education/sow

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Blood and Guts

Dear Teacher,

Thank you for having the *Blood and Guts* van visit your school. We hope you enjoyed investigating the human body with your students during this Science On Wheels experience. This flier is intended to help continue the enthusiasm generated by our visit and extend your students' learning.

The following activities have been selected because they are straight-forward, require few materials, and support state adopted learning objectives. We have identified and listed two corresponding Grade Level Expectations (GLEs) for each activity. The one page insert is written for your students, with activities you may choose to do as a class, or copy for home use.

Thank you again for having the *Blood and Guts* van visit your classroom and remember, have fun!

~Science On Wheels Teachers

Osmosis Eggs

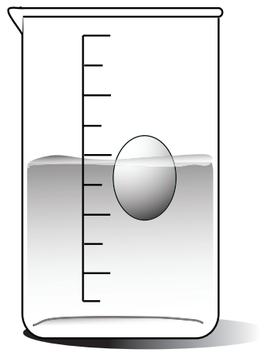
Use an egg to observe the effects of osmosis occur across a cell membrane.

1.2.6 Understand that organisms can be a single cell or many cells that form parts with different functions.

2.1.4 Understand how to use simple models to represent objects, events, systems, and processes.

Materials (per group)

- 3 raw eggs (more are needed for challenge activity)
- 6 beakers (250 ml or larger) or large-mouth glass jars
- blue food coloring
- corn syrup
- white vinegar
- salt (optional)



Procedure

- Place each of the eggs in a beaker of white vinegar and let them stand for 48 hours.
- After 48 hours the egg shell will have dissolved leaving the inside of the egg with its membrane (the cell membrane). Allow students to make observations.
- Carefully transfer the eggs to three different beakers: one filled with plain water, one filled with water and blue food coloring, and one filled with corn syrup. Let sit for a few hours.
- Observe the results with your class.

Challenge

Prepare 3 beakers of water with varying concentrations of salt. Place a freshly de-shelled egg in each. Does the salt concentration affect the rate of osmosis?

What's going on?

Osmosis is the movement of water from areas of higher concentration to areas of lower concentration. The membrane of the egg allows water to pass through without letting the contents of the egg escape, much like how the cells in our body work. Since there is a higher concentration of water outside the egg, the water flows into the egg, causing it to swell. The same is true for the water with the blue food coloring. Since the concentration of water is lower in the corn syrup than in the egg, water flows out of the egg causing it to shrink and shrivel.

More Than Meets The Eye

Materials

- illustrations below (ABC/12 13 14, old/young woman, and duck/rabbit)

Take a look at these optical illusions and discover the role your brain plays in interpreting sensory input!

2.1.3 Understand how to construct a reasonable explanation using evidence.

2.1.5 Understand how to report investigations and explanations of objects, events, systems, and processes.

Procedure

- Allow students to look at illustrations and share what they see.
- Ask whether or not they can see more than one image in each picture. If not, try to point out some features of each interpretation.
- Discuss the role your brain plays in interpreting what you see with your eyes.

Challenge

Can students create ambiguous illustrations of their own?

What's going on?

From birth on, sensory stimuli (what we see, hear, etc.) begin to create patterns in our brain tissue. These mental patterns are useful because they help us recognize familiar objects or circumstances. We rely on pattern thinking constantly without even being aware of it – it's how we know that a cat is a cat, and not a camel. When we observe things with our eyes, our brains make the most sensible judgment of what we are observing. When we see pictures with pieces missing, it is the pattern thinking of our brains that fill in the gaps. We may not see the same illusions as others because we have different previous experiences, which may lead to different pattern recognition.

Bendable Bone

The human body needs calcium for healthy bones and teeth. Use this activity to discover why!

1.1.1 Understand simple properties of common natural and manufactured materials and objects.

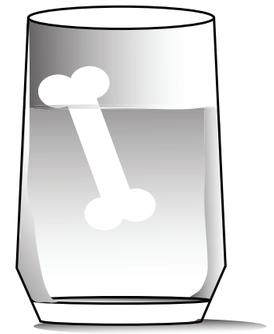
2.1.5 Understand how to record and report investigations, results, and explanations.

Materials

- 2 clean chicken bones (thicker ones like a leg bone are preferable)
- 2 large beakers or wide-mouth glass jars
- vinegar
- water

Procedure

- Fill one beaker with water and the other with vinegar.
- Give students an opportunity to see and feel the clean chicken bones. Discuss and record observations and predictions.
- Place a bone in each of the beakers and let them sit for 3-4 days.
- Remove bones from beakers and allow students to see and feel them once again. Discuss and record similarities and differences.



Challenge

Bones provide our body with a framework; discuss what life would be like without a solid skeleton. Discuss the importance of calcium in our diet. While dairy products are a common source of calcium, it is also found in non-dairy foods such as salmon, broccoli and soybeans.

What's going on?

Calcium is the primary substance that gives our bones their strength and stiffness. Vinegar contains an acid that dissolves calcium. The bone left to sit in the beaker with the vinegar has lost most of its calcium and will appear rubbery and soft. While human bones are not often exposed to such acids, they do lose stored calcium over time, resulting in osteoporosis in later life.

Tricky Temperature

Can you tell if something is hot or cold by touching it? Discover how you can trick your temperature receptors.

2.1.2 Understand how to plan and conduct simple investigations following all safety rules.

2.1.3 Understand how to construct a reasonable explanation using evidence.

Materials

- 3 buckets or large containers (additional containers will allow more students to participate in this activity simultaneously)
- ice water
- hot water (no more than 100°F)
- room temperature water

Procedure

- Fill one container half full with ice water, one with room temperature water, and one with hot water and place them in a row.
- Have students hold one hand in the hot water and the other hand in the cold water.
- After one minute, have students place both hands in the room temperature water. What do they feel? Do both hands experience the same sensation?

Challenge

What happens if students leave one hand in the cold water and move the other hand directly from the hot water to the cold water after one minute? Do both hands feel equally cold? What if students hold both hands in the hot water for one minute and then place one hand in the room temperature water and the other in the cold water?

What's going on?

The receptors in our skin rapidly become desensitized to repetitive sensory inputs. When we leave our hands in an uncomfortable (but not dangerous) warm or cold bath, the brain quickly begins to ignore that message and eventually begins to "reset" what is normal. When we switch baths, this "resetting" makes the new extreme feel much colder or hotter than it would if our hands had been kept at room temperature.