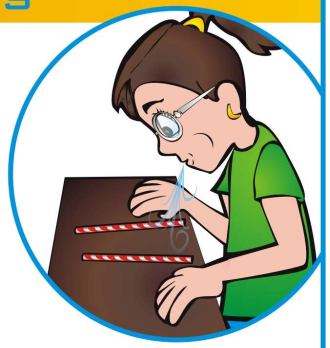
Today in Mad Science® we learned all about...

Science of Magic

- Magicians use science to do magic.
- Magic confuses what we sense with what we know.
- Magic uses misdirection to distract you during a trick.
- Sleight-of-hand is a trick in which your hands move too quickly to be seen.
- You need to watch carefully to understand both science and magic.
- Some magicians bend light with lenses or mirrors to create illusions.

Let's Try This At Home!

Magical Moving Straws



You Need: 2 straight plastic straws, table, chair, audience

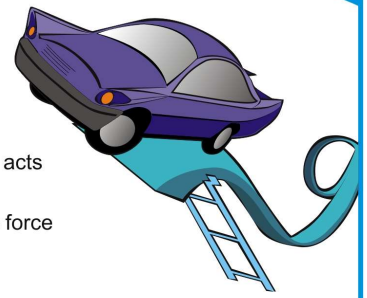
1. Announce that you can magically move the two straws apart.
2. Have a volunteer check that the straws are normal.
3. Sit at the table and place the straws in front of you, about three fingers apart.
4. Place your hands on either side of the straws.
5. Ask everyone to help you focus by saying "OMMMMM" while you rub your hands on the table top.
6. Bow your head over the straws. Secretly blow on the space between them. They will roll apart, as if by magic!
7. Take a bow as your audience cheers.

Explanation: You misdirected your audience by getting them to chant and by rubbing your hands on the table. Misdirection keeps them from noticing that your breath pushed the straws apart.

Today in Mad Science® we learned all about...

Fun-damental Forces

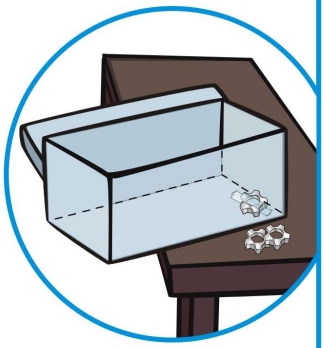
- A force is a push or pull.
- Gravity is the force that pulls you down.
- Centripetal force makes objects move in a circle.
- An object keeps moving or stays still unless a force acts on it. This is called inertia.
- Heavier objects have more inertia. They need more force to move or stop.
- An object balances at its center of gravity.



Let's Try This At Home!

Staying Centered

You Need: shoe box with lid, heavy weight (large metal washers work well), piece of tape, table, a friend



1. Balance your closed box on the edge of the table. Push the box slowly off the edge until you find the point at which it balances without falling over.
2. Mark this point on the box.
3. Tape the weight in one corner of the box and close the lid.
4. Find the balancing point and mark it on the box. Did you push more or less of the box off the table?
5. Turn the box around and try again. What happens?

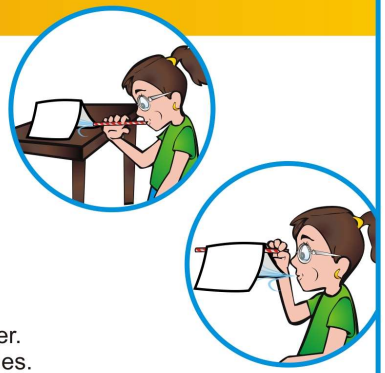
Explanation: The point where an object's weight balances is its center of gravity. A regular shoe box's center of gravity is in the middle. Adding weight in one corner moves the box's center of gravity. The box's center of gravity is now mainly over the weight. This changes the amount of the box that can balance over the edge of the table. Try challenging a friend – can they predict where the box will balance?

Today in Mad Science® we learned all about...

Fantastic Fliers

- Aircraft are flying vehicles.
- Lift and thrust are the forces that push aircraft up and forward.
- Gravity and drag are the forces that pull aircraft down and backward.
- Control surfaces change an aircraft's direction.
- Airplane wings have an airfoil shape.
- Air allows paper planes to glide across the room.

Let's Try This At Home!
Tent Flop



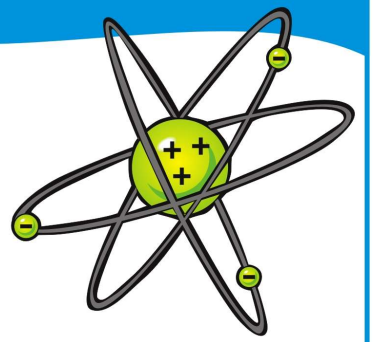
You Need: a piece of paper, a straw

1. Fold the paper in half lengthwise.
2. Unfold the paper to make a tent shape.
3. Blow quickly into the tent with the straw. What happens?
4. Use the straw to lift the tent.
5. Blow quickly into the tent under the straw. What happens?

Explanation: Air pressure is all around the paper. This means the air pushes the paper from all sides. You changed air pressure by blowing a stream of air. Blowing speeds up the air and lowers air pressure. This makes air pressure around your airstream higher. The higher air pressure pushes on the area of lower air pressure. This flattens the tent when you blow inside it. It sticks the paper together when you blow between the flaps. Air pressure differences like this help lift airplane wings in a similar way.

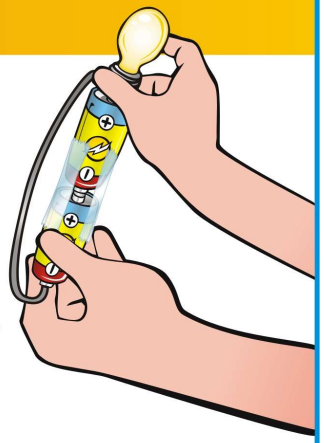
Today in Mad Science® we learned all about...

Current Events



- All things are made of atoms.
- Electrons are the parts of atoms that move around.
- Electrons make electricity if they move in a loop – or circuit.
- Electricity stops if the circuit is broken.
- A series circuit has one loop path.
- A parallel circuit has more than one loop path.
- Most metals conduct electricity.

Let's Try This At Home!
Flashlight Circuit



You Need: flashlight with batteries, scissors, aluminum foil, tape

1. Cut a narrow strip of aluminum foil. Fold it lengthwise and roll it to create a wire.
2. Make sure the flashlight works, and then remove its batteries and light bulb.
3. Tape the batteries end-to-end so that each positive end touches a negative end.
4. Touch the light bulb's base to the top of your stack of batteries. What happens?
5. Use your foil wire to connect the side of the light bulb's base to the bottom of your stack of batteries. What happens?

Explanation: You made a circuit! Electricity from the batteries lights up the bulb. Electrons create electricity when they move. Electrons only flow when they can move in a loop or circuit. You made a loop or circuit by connecting the battery stack to the light bulb with the foil wire. This allowed electrons to flow from the batteries, through the bulb and the wire, and back into the batteries again.

Today in Mad Science® we learned all about...

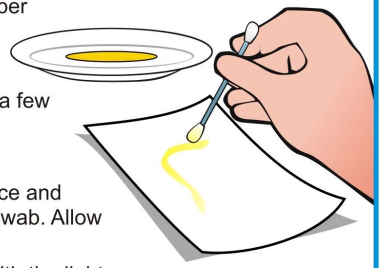
CHE-MYSTERY

- Chemistry is the study of substances.
- Substances are made of matter and take up space.
- Substances can be solids, liquids, or gases.
- A mix of substances makes a physical change when it does not form something new.
- A mix of substances makes a chemical change when it forms something new.
- We can tell a chemical reaction has happened when we see certain signs. Some signs are the creation of a new solid or gas, or a change in temperature or color.

Let's Try This At Home!

INVISIBLE INK

YOU NEED: half a lemon, saucer, water, spoon, cotton swab, white paper, tape, 100W light or hair dryer, adult helper



1. Tape the piece of paper to a tabletop.
2. Squeeze some lemon juice into the saucer. Add a few drops of water.
3. Mix the juice and water with the spoon.
4. Dip the cotton swab into the mixture of lemon juice and water. Write a message on the paper using the swab. Allow the paper to dry.
5. Ask an adult helper to carefully heat the paper with the light or hair dryer. What happens?

EXPLANATION: Your invisible message appears because of a chemical reaction! The lemon juice turns brown when it is heated. A color change is a sign of a chemical reaction. Chemical reactions are not reversible.

Today in Mad Science® we learned all about...

WACKY WATER

- Water exists on Earth as a solid, liquid, and gas.
- Density measures how heavy something is, compared to its size.
- Less dense matter floats on denser matter.
- Cold water is denser than warm water.
- Ocean currents flow because warm water floats above cold water.
- Water is important for life on Earth.
- Oil spills are harmful to ocean life.

Let's Try This At Home!

DENSITY DELIGHTS

YOU NEED: a glass, measuring cup, vegetable oil, water, food coloring, salt

1. Pour ¼ cup of water into the glass. Add two drops of food coloring.
2. Pour ¼ cup of oil into the glass.
3. Gently shake salt onto the oil for five seconds.
4. Observe the reaction. What happens?
5. Add more salt if you wish.

EXPLANATION: Less dense matter floats on denser matter. Oil is less dense than water, so it floats on water. Salt sinks because it is denser than oil and water. The salt carries a blob of oil with it as it sinks. When the salt dissolves in the water, it releases the oil. The oil blob floats back up to the top.

Today in Mad Science® we learned all about...

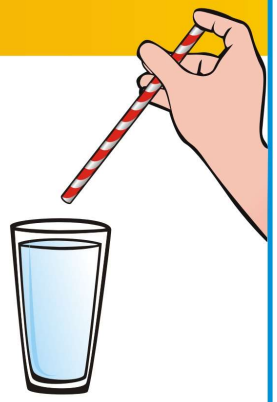
UNDER PRESSURE

- Air is the gas that surrounds the Earth. It pushes on us.
- The air around the Earth is called the atmosphere.
- Changes in air pressure affect the weather.
- High-pressure air moves towards low-pressure air until they balance.
- A gas in a small space is under more pressure than a gas in a large space.
- Bernoulli's principle states that the faster a gas flows, the less it pushes.

Let's Try This At Home!

SUPER STRAW

YOU NEED: glass of water, straw



1. Place the straw in the glass of water.
2. Cover the top of the straw with your finger.
3. Lift the straw above the glass with your finger still on the top. What happens?
4. Make sure the straw is above the water. Take your finger off the top. What happens?

EXPLANATION: Air pressure is all around the straw. The seal between your finger and the straw tip stops air from flowing into the straw. When you lift the straw above the glass, air pushes up on the water from under the straw. This atmospheric pressure keeps the water in place. Air flows into the top of the straw when you remove your finger. This lets the water flow out from the bottom.

Today in Mad Science® we learned all about...

SUPER STRUCTURES

- Structures support, span, or enclose things.
- Structures need to be strong enough to withstand forces.
- A force is a push or a pull.
- Loads create forces that act on structures.
- There are "live" loads that change, and "dead" loads that stay the same.
- Triangles, cylinders, and arches are strong shapes used in structures.

Let's Try This At Home!

CANTILEVER PRODUCTION

YOU NEED: a fabric bag with straps, a heavy book

1. Place the heavy book in the bag.
2. Rest the straps of the bag over your fingertips. Hold your arm straight out.
3. Rest the straps of the bag over your upper arm, near your shoulder. Hold your arm straight out. Was it easier to support the bag's weight on your fingertips or upper arm?

EXPLANATION: Your arm is like a cantilever. A cantilever is a structure. It is a beam supported on only one end. It bends to support loads. It supports more weight near the fixed end. It is easier to support the bag's weight on your upper arm close to your shoulder. Balconies and diving boards are examples of cantilevers.