Cub Scout Science

www.stlbsa.org/programs/stem/Pages/STEM.aspx

Boys show a natural tendency to explore their world. Science offers them the tools necessary to gain a better understanding of what they observe. Some boys may have a wide variety of interests in various scientific fields while others may have an interest in only one field. It will depend on the boy's individual preferences.

The Cub Scout science activities offer the boys an opportunity to be introduced to different scientific fields and gain experience through hands-on projects. You don't have to be an expert scientist in order to demonstrate the Cub Scout science projects. Do a little research and practice the experiments at least once before presenting it to your boys. Just "Do Your Best" and don't hesitate to ask a local science expert for assistance. Who knows, you may start a boy on a life-long journey of exploration!

Safety is very important when performing science projects. Do not use materials prohibited by the national office of the Boy Scouts of America, use personal safety equipment when necessary, and be sure to know how to handle emergencies that might arise because of the use of materials or equipment called for in the experiments.

If your boys are required to submit a science fair project as part of their school curriculum, Cub Scout science projects may be entered into local science fairs. This accomplishes two objectives at once.

Here are the categories of science offered by www.yahoo.com

Acoustics
Agriculture
Alternative
Amateur Science
Animals, Insects, and Pets@
Anthropology and Archaeology@
Artificial Life
Astronomy
Aviation and Aeronautics
Biology
Chemistry
Cognitive Science
Complex Systems
Computer Science
Earth Sciences
Ecology
Energy
Engineering
Forensics
Geology and Geophysics@
Hydrology@
Information Technology
Life Sciences
Mathematics
Measurements and Units
Medicine@
Meteorology@
Nanotechnology
Oceanography@
Paleontology@
Physics
Psychology@
Space

The Scientific Method

True scientists use the Scientific Method to observe and to draw conclusions based on their observations.

"Science is best defined as a careful, disciplined, logical search for knowledge about any and all aspects of the universe, obtained by examination of the best available evidence and always subject to correction and improvement upon discovery of better evidence." -- James Randi

The Scientific Method employs the following five steps:

1. Observe some aspect of the universe.
2. Invent a tentative description, called a hypothesis, that is consistent with what you have observed.
3. Use the hypothesis to make predictions.
4. Test those predictions by experiments or further observations and modify the hypothesis in the light of your results.
5. Repeat steps 3 and 4 until there are no discrepancies between theory and experiment and/or observation.

In other words, you see something happen, you think you know what you have just witnessed, you make a guess that you are probably correct, you invent a way to test your guess, and you perform experiments to see if your guess was correct.

Resources:

If you are intimidated by science topics, find someone who loves to share their expertise. This includes local school teachers, local science employees, moms and dads who work in a scientific field, and community college instructors. There are a myriad of science experiment books on the market. Many are designed to help the boys with their school science fair projects. The Internet is an excellent resource for finding science experiments for kids as well.

Cub Scout Handbook Science Projects

The various Cub Scout rank handbooks have a variety of science experiments that the boys can experience.

FOR TIGERS

3 DISCOVER NATURE
10 SOMETHING SPECIAL, ALL YOUR OWN
14 FAMILY GAMES, TRICKS, AND PUZZLES
16 TELL IT LIKE IT IS

FIELD TRIP IDEAS

AIRPORT	BAKERY	COLLEGE	DOCTOR	MINE
FIRE STATION	DENTIST	FARM	FACTORY	FISHING
LIBRARY	PARK	HOSPITAL	STATE PARK	
VETERANARIAN	BEACH	ZOO	NATIONAL FOREST	
WASTE MANAGEMENT				

FOR WOLVES

ACHIEVEMENTS
3 KEEP YOUR BODY HEALTHY
7 YOUR LIVING WORLD
8 COOKING AND EATING

ELECTIVES
6 BOOKS, BOOKS, BOOKS
7 FOOT POWER
8 MACHINE POWER
13 BIRDS
14 PETS
15 GROW SOMETHING
18 OUTDOOR ADVENTURE
19 FISHING
21 COMPUTERS

WORLD CONSERVATION AWARD
ACHIEVEMENT 7   ELECTIVE 13   ELECTIVE 15   ELECTIVE 19
CONSERVATION PROJECT

FOR BEARS

ACHIEVEMENTS
5 SHARING YOUR WORLD WITH WILDLIFE
6 TAKE CARE OF YOUR PLANET
9 WHAT'S COOKING?
12 FAMILY OUTDOOR ADVENTURES
16 BUILDING MUSCLES
17 INFORMATION, PLEASE
21 BUILD A MODEL

ELECTIVES
1 SPACE
2 WEATHER
3 RADIO
4 ELECTRICITY
5 BOATS
6 AIRCRAFT
7 THINGS THAT GO
11 PHOTOGRAPHY
12 NATURE CRAFTS
14 LANDSCAPING
15 WATER AND SOIL CONSERVATION
16 FARM ANIMALS
22 COLLECTING THINGS
23 MAPS

WORLD CONSERVATION AWARD
ACHIEVEMENT 5 ELECTIVE 2 ELECTIVE 12 ELECTIVE 15
CONSERVATION PROJECT

FOR WEBELOS

ACTIVITY BADGES
TECHNOLOGY ACTIVITY BADGE GROUP
ENGINEER
SCIENTIST

OUTDOOR ACTIVITY BADGE GROUP
FORESTER
GEOLOGIST
NATURALIST

WORLD CONSERVATION AWARD
FORESTER NATURALIST
OUTDOORSMAN CONSERVATION PROJECT

Cub Scout Academic and Sports Science Projects

The new Cub Scout Academics and Sports Program is a great way for boys to learn more about science. They can also earn belt loops for immediate recognition as an incentive. You may want to organize an academics fair. Get volunteers to teach an academics subject. Then have the boys take turns rotating from table-to-table, learning about the various academic subjects and earning their belt loops for the subjects they experience.

The following are needed to complete the Cub Scout academics Belt Loops:

Computers Belt Loop requirements:

1. Explain these parts of a computer: central processing unit (CPU), monitor, keyboard, mouse, modem, and printer.
2. Demonstrate how to start up and shut down a computer properly.
3. Use your computer to prepare and print a document.

Math Belt Loop requirements:

1. Do five activities within your home and school that require the use of mathematics. Explain to your Den how you used everyday math.
2. Keep track of the money you earn and spend for three weeks.
3. Measure five items using both metric and non-metric measures. Find out about the history of the metric system of measurement.

Science Belt Loop requirements:

1. Explain the scientific method to your adult partner.
2. Use the scientific method in a simple science project. Explain the results to an adult.
3. Visit a museum, a laboratory, an observatory, a zoo, an aquarium, or other facility that employs scientists. Talk to a scientist about his or her work.

Weather Belt Loop requirements:

1. Make a poster that shows and explains the water cycle.
2. Set up a simple weather station to record rainfall, temperature, air pressure, or evaporation for one week.
3. Watch the weather forecast on a local television station.

Wildlife Conservation Belt Loop requirements:

1. Explain what natural resources are and why it’s important to protect and conserve them.
2. Make a poster that shows and explains the food chain. Describe to your Den what happens if the food chain becomes broken or damaged.
3. Learn about an endangered species. Make a report to your Den that includes a picture, how the species became endangered, and what is being done to save it.

Hands-on Science Experiments

Boys learn by doing. Have them perform the experiments instead of just reading about them. The following pages are designed to be copied so that each of the boys can easily access the information needed to perform the experiments. If the experiments you intend to try may be dangerous, get the boy's parents to sign permission slips before hand. You may also want to encourage them to attend. Extra hands can be very useful. Have a "Den science night" and invite the boy's families to watch!

Super Soap Bubbles

Area of Science: **Physics**
Meant for Grade 7-9 (age 11-13).
This experiment is inedible.
An adult should be present.

Overview:
Learn about surfaces that soap bubbles form

Equipment:
Glycerin, water, liquid dishwashing detergent, wire.

Safety:
Don't spill it on the rug or furniture.

How to do the experiment:
Make a 50-50 mixture of glycerin and water. Add 5 % detergent. A couple of tablespoons to a cup of mixture. Exact proportions are not crucial. Experiment. Make wire frames of different shapes and dip in solution. If the frames are twisted the bubbles will form minimum surface area configurations.

Explanation:
The surface tension causes the surfaces to form minimum energy surfaces. Very cool mathematics, very cool bubbles. The interference of light gives rise to colors in patterns that change over time as the films change width.

Homemade Slime

Area of Science: **Chemistry**
Meant for at least Grade K-3 (age 5-7).
This experiment is inedible.
An adult should be present.

Overview:
Make slime from everyday things in the home.

Equipment:
Borax can be bought at your local grocery store in the laundry detergent aisle.
White glue can be purchased at a Mass merchandise store like Target, Walmart, or KMart.
Food coloring is optional but can be purchased in the grocery store in the baking aisle.
Ziploc bags can also be purchased at the grocery store.
Need measuring cups and spoons.

Safety:
Not to be fed to your pet or baby brother. Not good for leaving in carpets or on furniture overnight. To keep almost indefinitely, leave in Ziploc bag in refrigerator when not sliming! Not a bad idea to wash hands before (so it doesn't grow mold) and after (so mom will let you eat dinner) playing with it.

How to do the experiment:
Borax White Glue Water Food Coloring (optional) Ziploc bag

1. Borax is available in the laundry section of your local grocery store. Take a cup of water and add to it 1 Tbs. of borax (approx. 4% solution). Stir until completely dissolved.
2. Make a 50% water 50% white glue solution. Take 1/4 cup of each and mix thoroughly.
3. In a Ziploc bag, add equal parts of the borax solution to equal parts of the glue solution. 1/2 cup of each will make a cup of slime.
4. Add a couple drops of food coloring.
5. Seal bag and knead the mixture.
6. Dig in and have fun. Remember to wash your hands after playing.
7. Keep your slime in the sealed bag in the refrigerator when not playing with it to keep it longer. Unfortunately it may eventually dry out or grow mold. Just throw it out and start again!

Explanation:
The borax is acting as the crosslinking agent or "connector" for the glue (polyvinyl acetate) molecules. Once the glue molecules join together to form even larger molecules called polymers, you get a thickened gel very similar to slime. If you've tried this recipe (formula) before using blue starch (instead of the borax) with mixed results, you won't be disappointed with this one. Works everytime! If you have access to a chemical supply house, try a 4% solution of polyvinyl alcohol instead of the glue for a less rubbery polymer and one that is transparent showing off the color better.

Making a compass

Area of Science: **Earth Sciences**
Meant for at least Grade 4-6 (age 8-10).
This experiment is inedible.
An adult need not be present.

Overview:
Make a simple compass to find magnetic north, or south, depending on where you live.

Equipment:
1. Sewing needle ~1 inch (3cm?) long.
2. Small bar magnet. Refrigerator magnets may work if you don't have a bar magnet.
3. A small piece of cork.
4. A small glass or cup of water to float the cork and needle.

Safety:
Needles are sharp. Treat appropriately.

How to do the experiment:
1. Your compass will work better if you first run a magnet over the needle a few times, always in the same direction. This action 'magnetizes' the needle to some extent. Drive the needle through a piece of cork. Cork from wine bottles works well. Cut off a small circle from one end of the cork, and drive the needle through it, from one end of the circle to the other, instead of through the exact middle - be careful not to stick yourself!
2. Float the cork + needle in your cup of water so the floating needle lies roughly parallel to the surface of the water.
3. Place your 'compass' on a still surface and watch what happens. The needle should come to point towards the nearest magnetic pole - north or south as the case may be.
4. If you want to experiment further, try placing a magnet near your compass and watch what happens. How close/far can the magnet be to cause any effects?

Explanation:
The earth produces a magnetic field. This field, although weak, is sufficient to align iron and other **paramagnetic** compounds such as your needle within it. By floating the needle on the cork, you let it rotate freely so it can orient itself within the earth's magnetic field, to point toward the north or south poles of the planet.

Collecting Micrometeorites

Area of Science: **Astronomy**
Meant for at least Grade K-3 (age 5-7).
This experiment is inedible.
An adult need not be present.

Overview:
Collect micrometeorites from indoor and outdoor sources.

Equipment:

- Large piece of white paper or plastic
- Magnifying glass or a microscope - the microscope is better.
- Magnet
- Brush
- Small container

How to do the experiment:
Pick a sunny day to leave your plastic sheet outdoors. After some time, collect the sheet, roll the sides up, and gently tap all material into the center of the sheet.
An alternative to this procedure is to collect dust from areas such as the leaves from plants kept indoors or outside, or from windowsills. Use a brush to collect the particulate matter into a small container, then pour it onto a piece of paper or plastic.
Pass a magnet under the material and then gently tilt the paper or plastic to get rid of non-magnetic particles. Your meteorites will be found within the remaining material.
Inspect the particles under a magnifying glass or with a microscope. The microscope is preferred as the micrometeorites are more readily identified under higher magnification (10-20X).

Inspect the dust, looking for dark spherical particles with a pitted surface. Micrometeorites!

Explanation:
Tons of interstellar dust and debris bombard the earth every day. Much of this material formed with the rest of the solar system, 4 - 5 billion years ago.

Taking a Pulse (2 pages)

Area of Science: **Biological Sciences**
Meant for Grade 4-6 (age 8-10).
This experiment is inedible.
An adult need not be present.

Overview:
Take your pulse at multiple sites. Relate the pulse to heartbeat.

Equipment:
Nothing - free fingers. A diagram of the body and a stethoscope may be helpful.

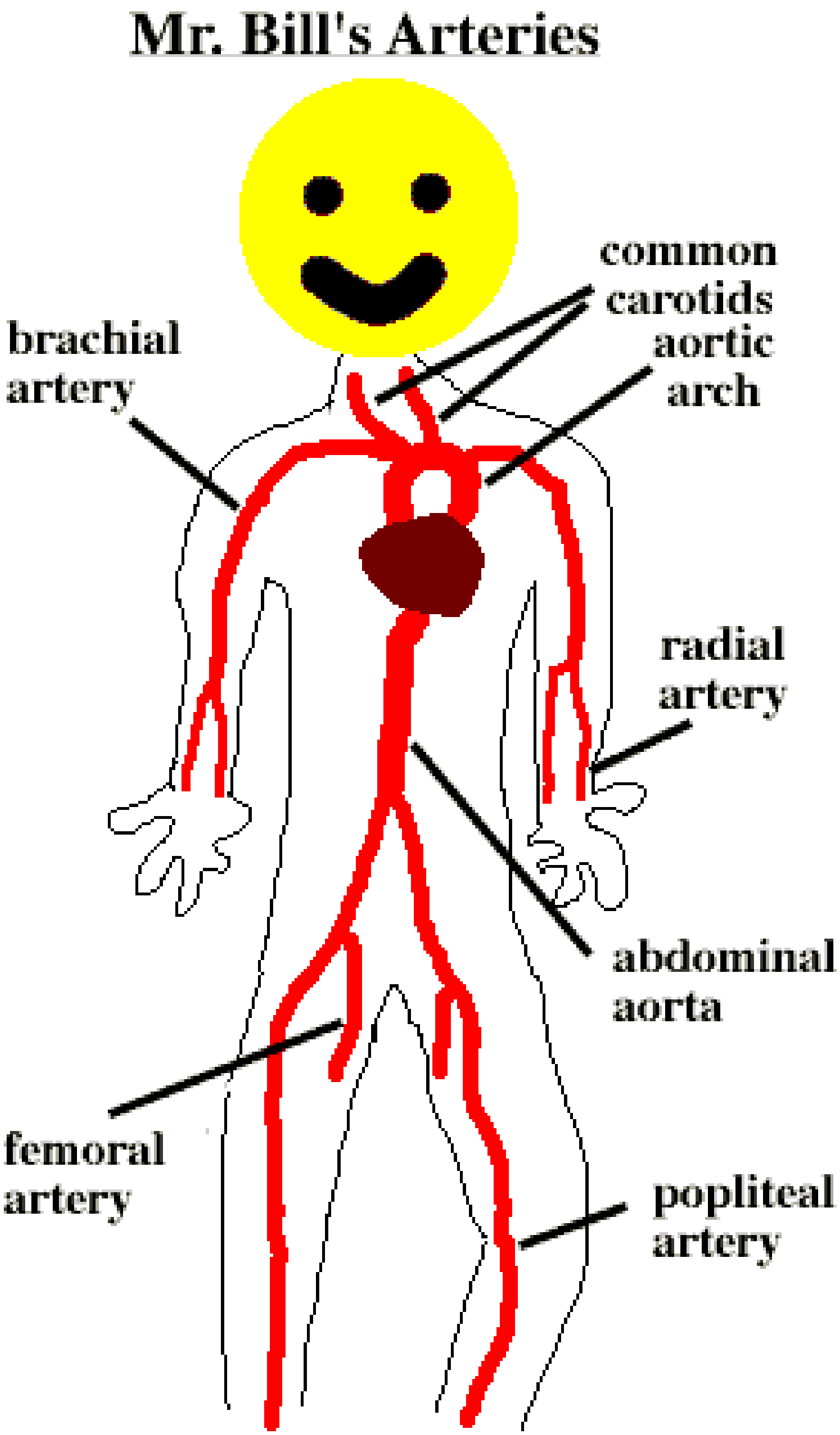
Safety:
When taking the carotid pulse in the neck, be certain to take one side at a time!

How to do the experiment:
Try taking your pulse at the following sites (see picture)

Explanation:
The pulse represents the beating of the heart, specifically the ejection of blood from the left ventricle to the general circulation of the body. The ventricles (right and left) have two phases: **diastole** or the time when the ventricles 'rest' so they can fill with blood, and **systole**, the time when the ventricles contract to send blood either to the lungs (from the right side of the heart), or to the rest of the body (from the left side of the heart). Blood from the left side of the heart first enters the **aorta**, the largest artery in the body. The aorta branches into smaller arteries that carry blood to all part of the body.
The pulse represents the variation in blood pressure from diastole to systole. During diastole blood pressure falls, but increases after systole as the heart pumps more blood into the arteries. You feel this difference when taking your pulse. Doctors use a device called a **sphygmomanometer** (blood pressure cuff) to measure the systolic and diastolic blood pressures. The average adult has a systolic blood pressure ~120-150 mm mercury, an average diastolic blood pressure ~80 mm mercury, and an average pulse of 72 beats/minute.

If you have a stethoscope try listening to your heart while taking your pulse. Your heart produces two sounds, often called 'lub' and 'dub.' The second,'dub' sound coincides with the ejection of blood from the ventricles. In actuality, the sound is produced by the aortic and pulmonic valves closing behind the ejected blood. The aortic valve opens from the left ventricle into the aorta; the pulmonic valve from the right ventricle into the pulmonary artery.

When does the pulse occur with respect to the second heart sound? The first heart sound?


Mr. Bill's Arteries
common
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radial
artery
abdominal
aorta
femoral
artery
popliteal
artery

Make a Sundial

Materials: Mostly art supplies: stiff cardboard, markers, a drafting compass, scissors.

Procedure: 1) Cut a circle of 7" in diameter. 2) Draw the diameter line. 3) at each end of the diameter line write "6". 4) At the 90¼ point write "12" 5) Between the 6 and 12 on the left write 7-11 at equidistant points. 6) Between the 6 and 12 on the right write 1-5 at equidistant points. 7) Construct the gnomon. This is an obtuse angle BAC where A is 45¼ (for Minneapolis) and the base Line CA is 3" long. 8) Fix the gnomon on the sundial with point C at mark 12 and point A near the center of the circle. 9) Set the sundial on a solid base and take it outside on a sunny day. 10) The gnomon should point due north (the ancients used the North Star)OR set the sundial at noon, so that the shadow is cast on the "12."

What happens: If the math and measuring is done well, the sundial will use the patterns of sun shadows caused by the rotation of the Earth to measure time. The sundial has several drawbacks besides not working at night. Children can think on this and an interesting brainstorm discussion is possible. Note:
1) As the length of daylight grows longer or shorter with the changing seasons, the sundial's measurement changes. 2) It doesn't work on rainy days, or cloudy days 3) You can't read it on partly sunny days when the sun is behind a cloud. 4) It will rarely agree with a clock. 5) It isn't portable like a watch or clock. 6) It can't be used indoors.

Make a “Night things” Capture Box

Concepts: Many insects that swarm at night are attracted to strong light. They can easily be lured to a live trap, captured and studied.

Materials: Plywood, ¾” X 1 ½” boards, carpenter's tools, an electric light, a funnel,
Or a cardboard box of sufficient size.

Procedure:
1) Obtain or construct a wooden box approximately 12” X 12” X 20”. The top panel should be removable. 2) Cut a hole approximately 5-6” in diameter in the top center. 3) Attach a brace to hang a light above the hole. 4) Insert a large plastic funnel that surrounds the light and empties into the box. 5) Place a large tray of water in the bottom of the box. This will kill many of the insects you catch without damaging them. 6) Place the trap outdoors on a warm summer night and turn on the light. In a matter of a few hours you will have gathered many species of insects.

CAUTION: Do not leave the trap out when not in use. Mosquitoes will breed in the water. Also remember that many insects will not die in the water, so be careful when opening. Biting mosquitoes, or angry bees, wasps and hornets may be inside. Do not open indoors.

Sound Travels

You need: A watch that ticks. A friend. A table.

Do this:
Stand on one end of the table and ask your friend to stand on the other end. Hold up your watch. Can your friend hear the ticking? Probably not. Ask your friend to press his or her ear to the table top. Hold the watch firmly against the tabletop. Try to keep the room perfectly quiet. Can your friend hear the ticking?

What does it mean?
Sound travels through all matter -- solids, like wood; liquids, like water; and gases, like air. Sometimes sounds can travel better through a solid than through a gas. All sound comes from vibrations. These vibrations can travel more easily through a flat tabletop where they have fewer directions to go. In the air vibrations can be scattered all over the room and there are fewer to reach your friend's ear.

Balance

YOU NEED: A water glass, two dinner forks (exactly the same), some clay, a toothpick.

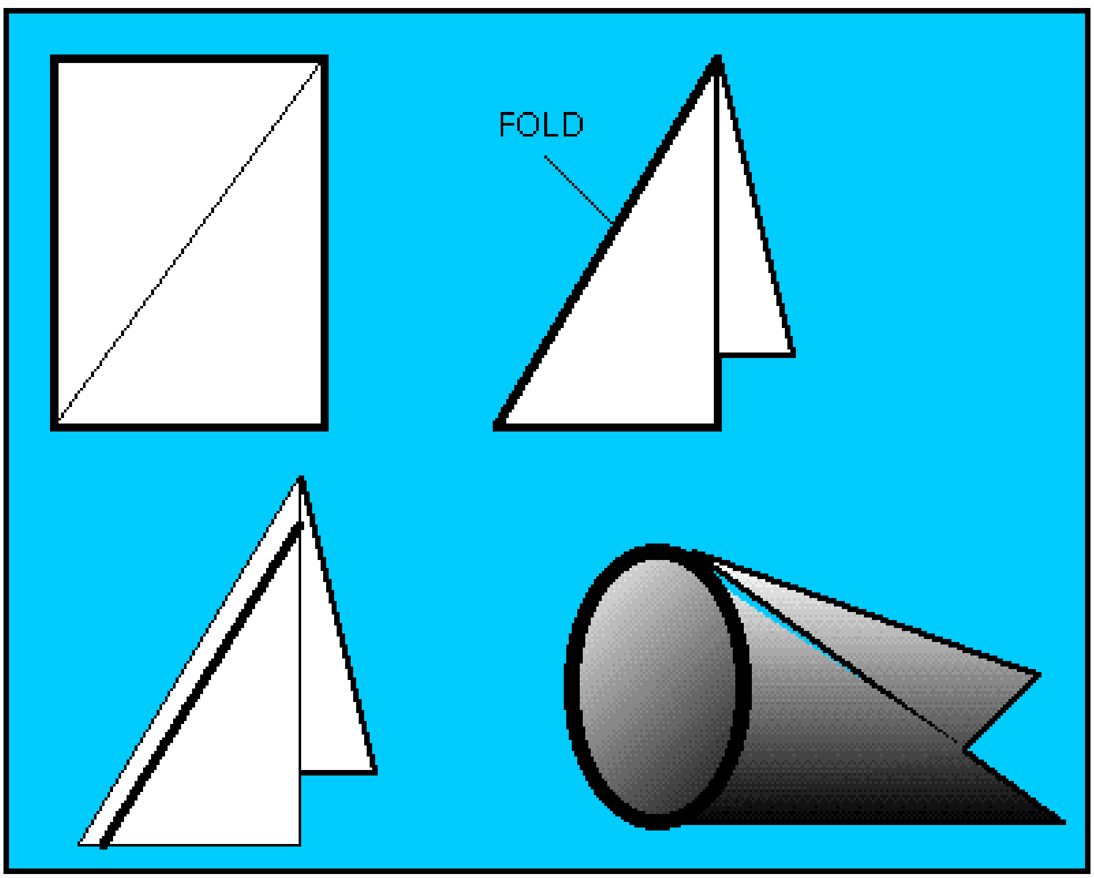
DO THIS: Form the clay into a ball about the size of a ping pong ball. Stab the toothpick into the clay and make sure it is secure. Now hold the clay so that the toothpick points straight down. Stab the forks into it. Think of the clay as a clock. The toothpick points to 6, and the forks point to 8 and 4. Now try to balance the device on the glass as shown. If it doesn't work, you might need more or less clay. You might need to move the forks or toothpicks. It will balance, but only if the weight and position of everything is perfect.

Lift

In order for anything to fly or glide it needs LIFT. You probably know how to make a paper glider. Try this Hi-Tech version.

YOU NEED: A piece of letter-sized paper, a piece of cellophane tape.

DO THIS: Fold the paper diagonally. This is tricky so be careful. The outside corners should NOT meet. Take the folded edge and make a 1/2" fold. Then make another 1/2" fold. Now you need to be as careful as a scientist. Bring the ends of the folded piece together to form the paper into a cylinder. The folded edge will "crinkle" so run your finger over it to form a smooth circle. Tuck one end under the other and tape or staple. You should have something that looks like the picture. Hold the TAIL between your first two fingers and thumb and give a GENTLE push. If you have trouble, experiment with stronger or gentler pushes, different holds, or a try making another more carefully.



The Dangers of an Oil Spill

Oil is a substance found deep in the Earth. Since it burns easily, we use it for heating our homes, running our cars, trucks and machinery and even for paving our roads and highways. How can something so good and useful be so harmful? Well, since we need so much of it, oil companies transport large amounts of it in huge ships called tankers. If a tanker crashes into a rock or iceberg and the oil spills out, it has a disastrous effect. Try this activity to learn more about the effects of oil spills on animals.

You need:
A large serving bowl or basin. Non Stick Spray. A cup of vegetable oil. A large feather.

Do This:
Lightly spray the Non-stick spray on the feather. Dip the feather lightly in the water and leave it submerged for 5 seconds. Look at the effect. Many birds have a light coat of fine oil on their feathers. It keeps them warm in cold water and repels the water so they can float more easily.
Now pour the cup of vegetable oil in the water and dip the feather as you did before. What happened to the feather? This thick coating of oil is hard to wash off. Many birds who must fly to feed, cannot do so and quickly starve. Some drown. Some are eaten by predators because they cannot fly away. The oil in the water floats at the surface and kills small animals and plants that other animals feed on. A large spill can break down the food-web and destroy the ecosystem for a long, long time.

Condiment SCUBA Diver

Squeezing a plastic bottle filled with water and a condiment packet makes the packet sink. Letting go of the bottle makes the packet rise.

Squeeze condiment packet (soy sauce, ketchup, etc.)
Clear plastic bottle with tight-fitting lid
A glass or cup of water

First, you have to figure out if your condiment packet is a good Cartesian diver candidate. Fill a glass with water and drop in your packet. The best packets are ones that just barely float.

After you have found the proper packet, fill an empty, clear plastic bottle to the top with water. Shove your unopened condiment packet into the bottle. Replace the cap... and you're done! Squeeze the bottle to make the diver sink, and release to make it rise. Amazing!

Many sauces are denser than water, but it is the air bubble at the top of the sauce that determines whether the packet will sink or swim. Squeezing the bottle causes the bubble to shrink. This smaller bubble is less buoyant and the packet sinks.

Balance and the Role of a Center of Gravity

The distribution of the mass of an object determines the position of its center of gravity, its angular momentum, and your ability to balance it!

Materials:
One 1/2 inch wooden dowel, approximately 3 feet long.
A lump of clay.

Place a lump of clay about the size of your fist 8 inches from the end of the dowel.

Balance the stick on the tip of your finger, putting your finger under the end that's near the clay. Now turn the stick over and balance it with the clay on the top. Notice that the stick is easier to balance when the clay is near the top.

The dowel rotates more slowly when the mass is at the top, allowing you more time to adjust and maintain balance. When the mass is at the bottom, the stick has less rotational inertia and tips more quickly. The farther away the mass is located from the axis of rotation (such as in your hand), the greater the rotational inertia and the slower the stick turns. An object with a large mass is said to have a great deal of inertia. Just as it is hard to change the motion of an object that has a large inertia, it is hard to change the rotational motion of an object with a large rotational inertia.
You can feel the change in inertia when you do the following experiment. Grab the end of the dowel that's near the clay. Hold the dowel vertically, and rapidly move the dowel back and forth with the same motion you would use to cast a fishing line. Next, turn the dowel upside down, and hold it at the end that is farthest from the clay. Repeat the casting motion. Notice that it is much harder to move the dowel rapidly when the clay is near the top. The mass of the stick has not changed, but the distribution of the mass of the stick with respect to your hand has changed. The rotational inertia depends on the distribution of the mass of the stick.

Blind Spot

The eye's retina receives and reacts to incoming light and sends signals to the brain, allowing you to see. There is, however, a part of the retina that doesn't give you visual information. This is your eye's blind spot.

Materials
One 3 X 5 inch (8 x 13 cm) card or other stiff paper
Yard stick
Marker

Do this:
Mark a dot and a cross on a card as shown.

Hold the card at eye level about an arm's length away. Make sure that the cross is on the right.
Close your right eye and look directly at the cross with your left eye. Notice that you can also see the dot. Focus on the cross but be aware of the dot as you slowly bring the card toward your face. The dot will disappear, and then reappear, as you bring the card toward your face.
Now close your left eye and look directly at the dot with your right eye. This time the cross will disappear and reappear as you bring the card slowly toward your face.
Try the activity again, this time rotating the card so that the dot and cross are not directly across from each other. Are the results the same?

The optic nerve carries messages from your eye to your brain. This bundle of nerve fibers passes through one spot on the light sensitive lining, or retina, of your eye. In this spot, your eye's retina has no light receptors. When you hold the card so that the light from the dot falls on this spot, you cannot see the dot.
As a variation on this blind spot activity, draw a straight line across the card, from one edge to the other, through the center of the cross and the dot. Notice that when the dot disappears, the line appears to be continuous, without a gap where the dot used to be. Your brain automatically "fills in" the blind spot with a simple extrapolation of the image surrounding the blind spot. This is why you do not notice the blind spot in your day-to-day observations of the world.

Pictographic Ambiguity

Pictographic Ambiguity is when a picture may have more than one image hidden in it. This is the famous, “My wife and my mother-in-law” (1959, W.E. Hill) pictograph. Do you see an old lady looking to the left and a young lady looking away?

Math Games

Guess My Number

You write or think of a number that your child must guess. For young children start with numbers up to 10 or 20. For older children, go as high as you both agree to. Your child guesses a number and you say "higher" or "lower." Your child adjusts the guess and tries again. Continue saying higher or lower until the number is guessed. Then switch roles with your child. For older children, you can add a limit to the number of guesses, such as 5 or 10 guesses. You only switch roles if your child guesses the number.

Pairs of 10

This game is for children learning to add. Cut out 20 small squares of paper and ask your child to write the digits 0 through 9 two times on the squares. (Use pencil so you can't see through the back of the paper.) Then turn the squares face down, mix them around, and put the scattered pile between you. In turn pick up one square at a time, turn it over and keep it. Each time two numbers have a sum of 10, remove the pair from your "hand" and score a point. The game is over when all squares have been picked. The person with the most pairs wins the round. After a couple of rounds, your child will notice that nothing can be paired with 0. If you wish, add two 10s to the squares.

Subtract From 100

You need 1 die (or 2 dice for older children) and each person needs paper and pencil. Write 100 at the top of your paper. In turn, throw the die (or dice) and subtract the amount from 100. The first person to get to zero wins the game. For a shorter game, start with 50. You can also reverse the direction for addition practice and try to get to 100 to win the game.

Tic-tac-toe?

Challenge your child to play tic-tac-toe in reverse. Force the other player to mark three X's or three O's in a row and he or she loses. The mathematical point? Thinking and reasoning skills.

Digit Search

Write a 3-digit number such as 356 on a piece of paper and keep it covered. Your child is allowed to ask questions about the digits to find out what they are, but is not allowed to guess an actual digit. Some questions might be: Is the ones' digit greater than 5? Is it less than 8? Is it an even number? Based on your *yes* or *no* answers, your child can conclude that the digit is 6 and can continue asking questions about the other digits until the number is guessed. Once a guess is made, the round is over. Then take turns thinking of a number and asking questions. To make the game more difficult limit the number of questions allowed for each digit to 4 or 3 questions. Then if your child hasn't narrowed down the choices, he or she has to guess! You can also increase the size of the number to 4 or 5 digits.

Scientific Research Questions?

Have the boys research these questions either individually or as a group. This will teach them how to research questions, use of resources, and they just might learn something along the way.

Is a full moon larger at the horizon or higher up in the sky?

Why do leaves change color in the fall?

Why does a straw in a glass of water look broken?

Why is the sky blue?

Why don't spiders stick to their webs?

What makes thunder?

Why is it 9 a.m. in Los Angeles the same time it is noon in New York?

How big is Earth?

Where does wind come from?

How does a toilet work?

How does a microwave oven cook food?

Is sugar good for my body?

Why do we have saliva in our mouths?

What is the Fujita Scale?

Why does rain fall in drops instead of in a stream like from a faucet?

How many people have walked on the moon?

How does an airplane stay in the air?

How does a boat stay afloat?

How much money does a scientist earn each year?

What do I have to do to become a scientist?