

2010 Science Workshops for Home Educators and their Families

For details about registration, costs, and times go to

http://www.paperdiscoverycenter.org/general/homeschool_science_2010_flyer.pdf

Jan. 22 – Electricity

Jan. 29 – Color

Feb. 5 – Sight

Feb. 12 – Water Chemistry

Feb. 19 – Forces

Feb. 26 - Flying Objects

Mar. 5 - Sound

Mar. 12 – Pi-Einstein Day

ELECTRICITY

Learning Objectives: Understand the following terms and concepts: electricity, conductor, insulator, closed circuit, series and parallel circuits, voltage, and electromagnets.

- Role play a conductor particle and the flow of charged particles in a closed circuit.
- Identify conductors and insulators with a 'light up' game; be surprised by a few unexpected results.
- Explore series and parallel circuits with a hands-on board. Discuss the pros and cons of each.
- Make a paper doll dance with electro-magnetic force and see the interaction between electrical and magnetic fields.
- Test your new learning of electricity with a light-up quiz board; you'll learn enough to go home and make one for yourself!
- Observe the differences in holiday lighting over years and see how inventions and engineering ingenuity are helping to conserve energy.

COLOR

Learning Objectives: Understand how we see colors and why things are the color they appear. Identify some applications that use color changes.

- Watch a demonstration that burns chemicals producing flames of many colors, showing how fireworks get their color.
- Learn about the cones in the eye and how they help us detect color.
- Activities with flashlights, filters, and computers will shed 'light' on the difference between emitted and reflected colors.
- Make colored paper with dyes present in common veggies and explore how some are sensitive to acidity level.
- A hands-on activity shows why the sky is blue and the colors change at sunrise and sunset.
- Experiment with chemical tests used in the paper industry and unveil hidden messages through color changes.
- Solve a crime using chromatography and analysis of the color response.

SIGHT

Learning Objectives: Understand the role light plays in sight. Understand how the variables in reflection and refraction can unveil different images (plane, convex, and concave mirrors, and lenses). Identify applications of these principles in technology (kaleidoscopes, periscopes, telescopes, cameras, etc). Gain insight into the anatomy of the eye - why sight problems arise and what the issues are.

- Make a kaleidoscope and periscope to take home.
- Experiment with simple cardboard tubes to see how a telescope and camera work.
- Observe optical illusions to appreciate how the mind's interpretation of images impacts sight.
- Identify the parts of the eye and their function in a matching game with 2D and 3D models.
- Learn about mirrors and reflection with models and samples.
- Look through specially designed glasses that exhibit eye problems common in aging – cataracts, glaucoma, macular degeneration, and lens yellowing.

WATER CHEMISTRY

Learning Objectives: Understand how water transitions between states of matter (solid/liquid/gas). Know the water cycle, appreciate the importance of water, and recognize our stewardship responsibility in sustaining this natural resource. Understand the characteristics of water that yield a high surface tension, and how that surface tension can be altered.

- Explore the connection between water and paper.
- Use magnetic molecular models and analogies to understand the properties of water. Use the periodic table to identify the atoms in a water molecule.
- Role play water molecules going through the states of matter and discuss the water cycle to make this relevant.
- Create a model of a community and explore how topography and human activity, work with the water cycle, to affect water quality.
- Boil water with ice cubes to understand the effect of pressure in phase changes.
- Be fascinated by surface tension - – float metals which you think should sink, see how big a water drop can get, create giant soap bubbles.

FORCES

Learning Objectives: Understand the following terms, concepts, and laws: force, pressure, fluid, inertia, Newton's laws, Bernoulli's principle, and center of gravity.

- Make paper and describe the forces involved.
- Break a piece of wood with newspaper and lift paper cups without touching them, as you explore the power of gas pressure.
- Explore Bernoulli's principle and its applications with many hands-on activities.
- Identify the center of mass, experience the impact that center of mass has on balance.
- Solve a problem with equal and opposite forces and discuss how it connects to Newton's laws.
- Experience the impact of inertia in car accidents and the value of seat belts.

FLYING OBJECTS

Learning Objectives: Understand the variables which impact flight in the air and how they affect the path and motion of the objects. Expose students to fun tools which can be used to run further experiments and perform scientific exploration.

- Make kites out of paper, discuss follow-up experiments for home.
- Make paper rockets and launch them into the air.
- Launch projectiles across the room.
- Use origami to make birds out of folded paper.
- Drop parachutes down a stairwell and experiment with variables of mass and surface area.

SOUND

Learning Objectives: Understand how energy transferred through waves and the anatomy of the ear result in our ability to 'hear'. Learn how 'hearing' differs among some animals. Identify the variables in music instruments, such as tube length and resonance, and the result it has on sound.

- Hands-on activities explore vibration resulting in sound – including: twangs, bangs, whooshes, and toots. Experiment by changing the variables.
- Diagrams of the ear show how the vibration is translated into sound.
- Role play particles in a medium that show how energy is transferred

Pi-EINSTEIN DAY

Learning Objectives: Recognize some of Einstein's contributions. Understand the connection between Pi and a circle. Identify that Pi is an irrational number – the numbers after the decimal never end or repeat. Identify how to measure speed.

- A celebration day with scavenger hunts and art projects: make a box in the shape of a pie piece, make circle shaped paper, make a pi chain to emphasize the endless numbers after the decimal point.
- Watch a short Cosmos video (the educational TV series with Carl Sagan) showing a thought experiment on the speed of light. Expose students to the equation, $E=mc^2$
- Run an experiment to measure the speed of a toy car. Evaluate the data and discuss the scientific process.