HOT AIR BALLOONS → MEZZANINE BRIDGE

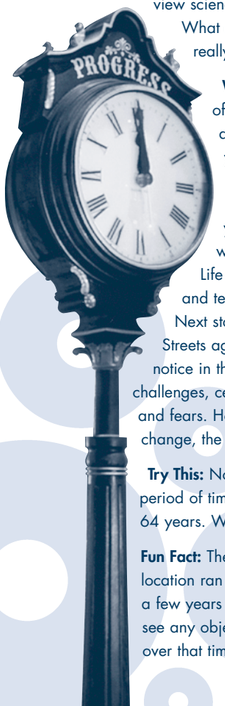
Inquiry Starters: What happens when you trap hot air inside a balloon and then "let go"? How does density of air cause something to float? Can you get the hot air balloon to float all the way up to the ceiling? Can you balance the balloon halfway between you and the ceiling?

What's Going On? Hot air is less dense than cold air. Hot air molecules take up more space than the same number of cold air molecules. These molecules also have more energy! Filling the balloon with hot air gives the balloon buoyancy (lift). When the balloon is released, the buoyancy allows the balloon to float up until the air on the outside reaches the same density as the air inside the balloon. Adding more hot air at the right time makes the balloon fly longer.

Try This: Go to Gadgets and check out the Flying Propellers. What keeps the propellers afloat?

TIME TRAVELING → PROGRESS

Inquiry Starters: What was life like "way back when"? How did people view science and technology? What tools did they have? What else was going on in the world? Does history really repeat itself?



What's Going On? As you enter into the town of Progress, you walk onto the corner of Hope and Fear Streets in the year 1898. What do you notice around you? How could you describe the science and technology of the time? By interacting with the townspeople, you get a sense of what the issues of the day were, and especially how they feel about them! Life is full of emotions. When it comes to science and technology, hope and fear are always involved. Next stop: 1962, on the corner of Hope and Fear Streets again. What similarities and differences did you notice in the two settings? Each time period has unique challenges, celebrations, opinions, and (of course) hopes and fears. However, as the saying goes, the more things change, the more they stay the same!

Try This: Now that you have experienced Progress over a period of time, imagine what it would look like in another 64 years. What about 64 years after that?

Fun Fact: The Street of Yesteryear at COSI's previous location ran from roughly 1780 to 1923, with each shop a few years later in time than the previous one. Do you see any objects in Progress that may have been around over that time period?

RESOURCES FOR FURTHER EXPLORATION

Continue the fun at home! Science happens all around us, all the time. Check out these resources to learn more!

www.cosi.org
www.scienceyear.com
www.factmonster.com
www.firstscience.com
www.hightechscience.org
www.infoplease.com

COSI
EXPLORE SCIENCE. DISCOVER FUN!®

little KIDSPACE®

ACTIVITIES FOR KINDERGARTEN AGE AND YOUNGER

Parents, below you will find fun questions to ask your child as they explore the little kidspace exhibition area.

FIND THE BRIGHT GREEN HELICOPTER JUST OUTSIDE THE CLINIC...

A patient just arrived in the helicopter! Where will you go from here? Does the patient need to ride in the ambulance? Can you drive the ambulance? How do the lights work? Can you make a noise like a siren? Take your patient to the Clinic. Find a doctor's lab coat and a stethoscope. What can you hear with the stethoscope? Can you find bandages, crutches and everything else you need to fix up the patient? Little kids often make the best doctors and nurses. Role-playing helps us learn that it does not have to be scary to be sick.

GO TO THE THEATER AREA WITH THE CAMERA AND THE PROPS...

Will you be the performer or the camera operator? What props will you need for your performance? Can you make up a story and act it out? Does the story have a hero? How does the camera work? Can you zoom in and zoom out? If you like directing a story, go to Space or i|o and make a movie at the Animation Station. Acting out and pretending shows a great imagination!

ROLL SOME BALLS DOWN THE DOUBLE RAMPS...

Look at the two ramps. How are they the same or different? Move two balls to the top of the ramps. Which one will reach the bottom first? Why? Let go of the balls and see what happens! Does the ball on the straight ramp or the curvy ramp win? Try different size balls and race them against each other. Which ones go down the ramps the fastest? Kids learn early that things fall down, but sometimes things fall faster or slower than we think they will!

GO TO info.kid AND PAINT A PICTURE...

Can you paint a picture by using just your fingers on the screen? Can you change the color of what you are drawing? Can you have more than one color on the screen? How does the computer know your hand is there? Can you draw a picture of your day at COSI? If you like to draw pictures on the screens, check out Electronic Finger-painting in i|o.

TRY THIS... AT HOME!

Try these cool activities at home. They are some of COSI's favorite activities. Work together, adults and kids, to learn and have fun. It's amazing how much science is in things that you have around your house!

COSI'S BUBBLE RECIPE

MATERIALS NEEDED
- 1 gallon of water
- 1/2 cup dishwashing liquid (Dawn works best!)
- 1/4 cup glycerin (available in most drugstores)
- Bucket and tray
- Wands

Find a spot in your house, or even outside, where you can make lots of bubbles and where the floor is not slippery. You may want to spread some old towels down first if you make bubbles inside. Mix all ingredients together in a large bucket. Pour the mixture into a shallow tray to get the most surface in contact with the air. Find tools in your house that could serve as bubble wands. You will want the tools to have various sizes and shapes of openings.

What are bubbles made of? What is inside of the bubbles? What would happen if you used a wand with a square opening? How large and small can you make the bubbles? How long can bubbles last before popping? Why can you see a rainbow in your bubble?

COSI'S FLUBBER RECIPE

MATERIALS NEEDED
- 1 cup white glue (Elmer's works best!)
- 3/4 cup warm water
- 1 Tablespoon 20 Mule Team Borax (available in the laundry aisle of the grocery store)
- 2/3 cup cold water
- Newspapers
- Food coloring
- Mixing bowl and spoon

Spread the newspapers down on a table. Flubber can be messy! In the bowl, mix the warm water and glue together until smooth. Add the Borax to the cold water and mix well. Add a small amount of food coloring. Carefully mix the Borax solution into the glue solution. When all the liquid has been absorbed, play with the mixture. Does it stretch? Can it be rolled into a ball? Does the ball keep its shape? Does it bounce? Can you form a thin layer across your hand? Will it ooze between your fingers? What else can you make the Flubber do? Flubber is an example of a non-Newtonian substance. It seems to be a liquid and a solid at the same time. Can you think of any other non-Newtonian substances? (Hint: look in your windows!)

PARENT'S GUIDE

HOW TO USE THIS GUIDE

Experience COSI exhibits in a whole new way by using the questions, information and activities found in this guide.

Get more out of your visit to an exhibit by making hypotheses, asking questions and using all your senses to observe the exhibit. What is going on around it? What do you hear? How does it feel? Inside you'll find starting questions (Inquiry Starters), information (What's Going On?) and suggested directions on where to go next (Try This). The "Try This At Home" activities panel will further engage all the members of your group to continue learning at home.

WHAT IS INQUIRY LEARNING?

COSI's exhibits are designed according to the principles of inquiry. The inquiry method of learning engages the learner by encouraging you to ask questions, make observations, and draw conclusions. This way, you truly learn about the content and the processes of science.

40 YEARS OF COSI!

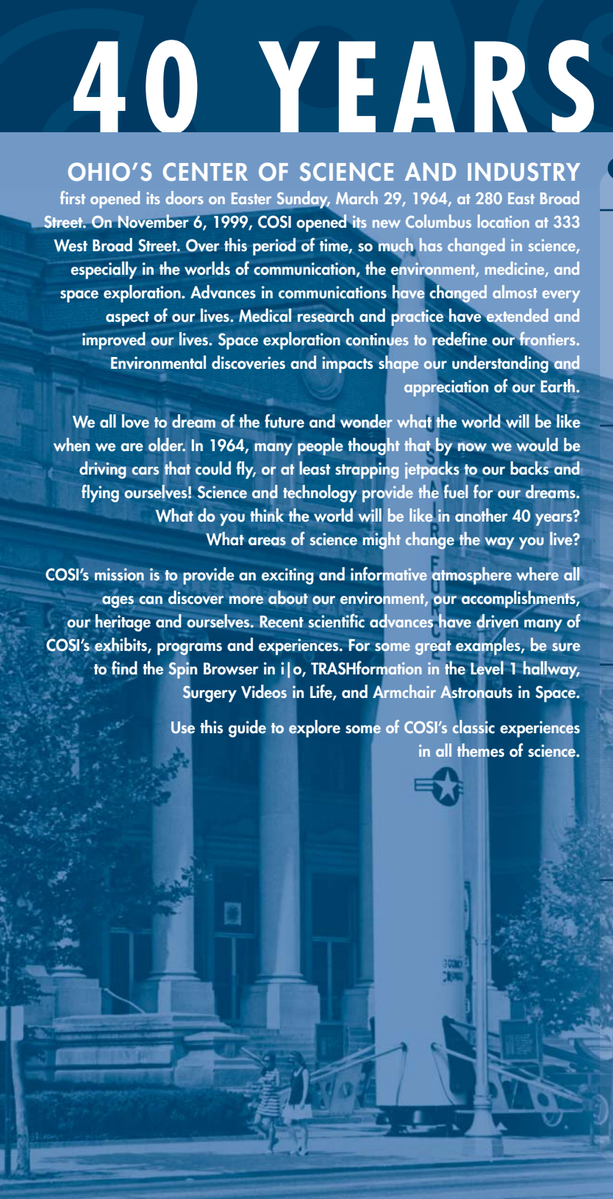
OHIO'S CENTER OF SCIENCE AND INDUSTRY

first opened its doors on Easter Sunday, March 29, 1964, at 280 East Broad Street. On November 6, 1999, COSI opened its new Columbus location at 333 West Broad Street. Over this period of time, so much has changed in science, especially in the worlds of communication, the environment, medicine, and space exploration. Advances in communications have changed almost every aspect of our lives. Medical research and practice have extended and improved our lives. Space exploration continues to redefine our frontiers. Environmental discoveries and impacts shape our understanding and appreciation of our Earth.

We all love to dream of the future and wonder what the world will be like when we are older. In 1964, many people thought that by now we would be driving cars that could fly, or at least strapping jetpacks to our backs and flying ourselves! Science and technology provide the fuel for our dreams. What do you think the world will be like in another 40 years? What areas of science might change the way you live?

COSI's mission is to provide an exciting and informative atmosphere where all ages can discover more about our environment, our accomplishments, our heritage and ourselves. Recent scientific advances have driven many of COSI's exhibits, programs and experiences. For some great examples, be sure to find the Spin Browser in i|o, TRASHformation in the Level 1 hallway, Surgery Videos in Life, and Armchair Astronauts in Space.

Use this guide to explore some of COSI's classic experiences in all themes of science.



A FEW SCIENTIFIC HIGHLIGHTS FROM THE PAST 40 YEARS →

COMMUNICATIONS

1969: The Internet is launched. Interface Message Processors are installed in computers at UCLA and Stanford University. UCLA students "log-in" to Stanford's computer and exchange data. Today, it is estimated that millions of people are on-line.

1983: Cellular phones are introduced. The first phones weigh over two pounds and cost about $3,600. Today, phones weigh mere ounces and the average cost is $50.

ENVIRONMENT

1985: Scientists confirm holes in the Ozone Layer above Antarctica. Ozone depletion is recognized as the world's first truly global environmental problem. This results in legislation to ban ozone-depleting chemicals, like CFCs (chlorofluorocarbons).

1991: The Biosphere 2 project begins in Arizona with a crew of eight scientists to study in an airtight replica of the Earth (Biosphere 1) over two years. The structure contains five biomes, including a 900,000-gallon ocean, a rainforest, a desert, agricultural areas and a human habitat.

MEDICINE

1978: First test-tube (In vitro) baby is born. The mother's egg and the father's sperm are combined in a laboratory and then implanted into the mother's womb. To date, tens of thousands of babies have been conceived via In vitro fertilization.

2000: Scientists crack the human genome, or DNA code. Researchers learn that humans have only about 30,000 genes. It is estimated that each cell of the human body contains over three billion bits of DNA.

SPACE EXPLORATION

1984: First EVA (space walk) is performed by an American woman, astronaut Kathy Sullivan. STS-41G and its crew of seven complete 132 orbits of Earth in 197.5 hours. The EVA is performed to demonstrate the feasibility of satellite refueling. Sullivan flew on two more Space Shuttle missions, including the mission to launch the Hubble Space Telescope, the largest payload ever delivered to space.

1998: The International Space Station begins to be assembled in Earth's orbit. Over four times larger than the Russian space station, Mir, the ISS will have a total mass of about one million pounds. It will measure 360 feet across and 290 feet long with almost an acre of solar panels to provide electrical power.

MERCURY CAPSULE → SPACE

Inquiry Starters: Is that a real spacecraft? What would it feel like to fly to space? What would the Earth look like from space? Who traveled in a spacecraft like this?

What's Going On? The Mercury Capsule is a replica of the spacecraft astronaut John Glenn took into obit around Earth. Try the experience of a simulated launch sequence. (It is much shorter than what real astronauts experience!) While the Mercury Capsule is in motion, be sure to look up! The view is lovely! While you wait your turn, check out the artifacts from John Glenn's historic trip.

Fun Facts: At COSI's previous location, the Mercury Capsule was often the first and last exhibit with which visitors interacted, located along the ramp in the Solar Front. A model of the Earth was on the second floor and could spin, showing visitors how the planet moved and how the sun's light makes our days and nights.

ELECTROSTATIC GENERATOR → ATRIUM

Inquiry Starters: How does static electricity make hair stand on end? What are charges? What do like charges do to each other? What do opposite charges do to each other?

What's Going On? The Van de Graff generator works by building up friction. Friction is the result of two surfaces rubbing against each other. A belt inside the generator rubs up against a series of brushes, causing electrons to jump from atom to atom. Atoms that gain electrons are negatively charged. Those that lose electrons are positively charged. Two hundred thousand volts of static electricity are built up inside the generator, and then transferred to whatever touches the generator. Negative charges are pulled to the bottom of the generator, which leaves the participant positively charged. Each strand of hair is positively charged, and since like charges repel each other, each hair tries to get as far away from hairs next to it as possible. The result is a very cool hair-do!

Try This: Try rubbing an inflated balloon against the hair on your head. This will cause a build-up of charge, or electrons, to be deposited on the balloon. Your hairs will stand on end and the balloon will be slightly attracted to surfaces like a wall, which has a neutral charge.

RAT BASKETBALL → LIFE

Inquiry Starters: How can you train an animal to perform a task? Are rats competitive? Do the rats use a real basketball? What would happen if you placed two male rats together?

What's Going On? Rats are trained using operant conditioning, along a step-by-step process to familiarize them with performing. Positive reinforcement (treats) rewards the rats for appropriate behavior. Male rats tend to fight for the ball, whereas female rats are more friendly competitors. Why do you think this is? See today's show schedule for times.

Fun Fact: The rats need to gnaw or chew on things to keep their teeth from growing too long. The balls from roll-on deodorant are used as basketballs because they are the perfect size for the rats' teeth.

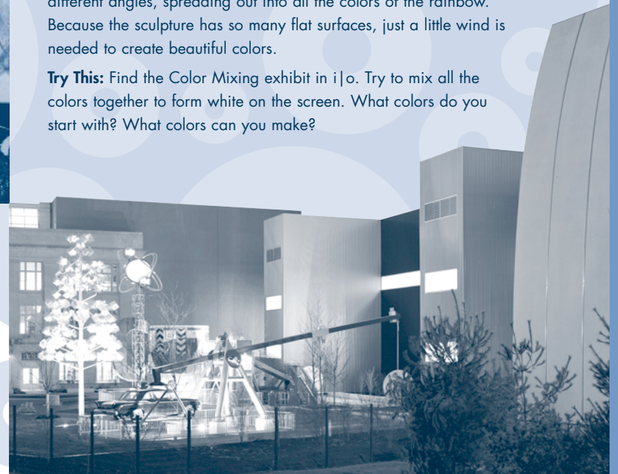
Try This: Attend a MIND show on the Life Stage to see if humans can be conditioned, too!

SCIENCE SPECTRUM TREE → BIG SCIENCE PARK

Inquiry Starters: Where do all the colors come from? Is there a motor inside the sculpture that makes all the cubes turn? Why does the light reflect in certain directions and not reflect in others?

What's Going On? Sunlight is considered white light because it is a mixture of all the visible colors, or wavelengths, of light. Each surface on the Science Spectrum has a diffraction grating with 20,000 etched lines per inch. When light hits these extremely small lines, they change the angle of reflection of the light. This produces a rainbow effect at different angles, spreading out into all the colors of the rainbow. Because the sculpture has so many flat surfaces, just a little wind is needed to create beautiful colors.

Try This: Find the Color Mixing exhibit in i|o. Try to mix all the colors together to form white on the screen. What colors do you start with? What colors can you make?



COSI Classics

COSI

EXPLORE SCIENCE. DISCOVER FUN!