STEM Odyssey

PROGRAM MANUAL

Harnessing Heat

Lights...Color...Action!

Magnetic Magic

Mission: Nutrition

Optical Illusions

Smelly Science

Sonic Sounds

Watts Up

Mad SCIENCE

AFTER-SCHOOL PROGRAM

HARNESSING HEAT!

SUMMARY:
Children learn about the concepts of heat and heat transfer. They act out hot and cool molecule movements, and experiment with a pair of unequal copper pipes to feel heat change. The children witness the practical side of heat-sensitivity—thermal paper browns under the force of a heat gun and ice cubes melt on a heat transfer block. Children get hands-on building thermometers, participate in a tactile temperature test, and heat things up in a thermometerchanging, sand-shaking session. The Heat Sheet Take- Home kit is a temperature-sensitive card that children take home to extend their learning experience.

EDUCATIONAL VALUE:
This class introduces children to the physical facts about heat. Children learn how molecules move at different temperatures and how thermometers work. The instructor uses various tools like a heat gun and thawing blocks to demonstrate how we use temperature- sensitive equipment in our everyday lives. A series of interactive heat-induced experiments show how the hot and cold we feel is relative. Shaking up a bottle of sand shows how friction increases temperature. Children explore materials that transfer heat at different rates.

TAKE-HOME MESSAGE:
1. Friction creates heat.
2. We use thermometers to measure heat.
3. Hot molecules move around faster than cold ones.

AFTER-SCHOOL PROGRAM

LIGHTS...COLOR...ACTION!

SUMMARY:
Children observe demonstrations that blend colors to produce white light, and others that separate white light into colors. Experiments with prisms and diffraction lenses give children the opportunity to explore the color spectrum of various light sources. A chromatography activity demonstrates separating printed colors on a filter. The instructor leads an activity from white light to the ultraviolet range. Children look at the world through tinted lenses to experience colorblindness and see through the eyes of animals. A lightinduced, optical effects Technicolor Blender Take- Home completes this illuminating adventure!

EDUCATIONAL VALUE:
Enter the world of light and color. Exciting experiments on white light including color-wheel blending and prism-splitting spectrums introduce Newton's color theory concepts. Children learn the differences between mixing colored light and mixing colored paint. Activities involving spectroscopes, ultraviolet light, and chromatography provide lessons on scientific techniques used to study the physics of light. Children build Technicolor Blenders to demonstrate Newton's color wheel invention.

TAKE-HOME MESSAGE:
1. White light contains all the rainbow colors.
2. Objects absorb certain colors and reflect other colors.
3. We see the colors an object reflects.

AFTER-SCHOOL PROGRAM

MAGNETIC MAGIC

SUMMARY:
Magnetic Magic reveals the science behind magnet magic and magnetism mysteries. Children use magnetic wands, explore magnetic attracting and repelling forces, confuse compass needles, and magnetize paper clips. Entertaining demonstrations show the magnet's gravity-defying abilities and educate children about the Earth's magnetic properties. Children continue the lessons at home with the Magnet Lab Take-Home.

EDUCATIONAL VALUE:
Children learn how and why magnets behave by testing the basic physical principles governing magnetism. They learn how to create magnets and how magnetism is lost. Children use compasses to gain a better understanding of how humans benefit from the Earth's magnetic force. Hands-on experimenting—from swinging compasses to motorized devices— allows children to explore the role of magnetism in our everyday lives.

TAKE-HOME MESSAGE:
1. Magnets have a north and south pole.
2. A magnetic field stretches between a magnet's north and south poles.
3. Some metals magnetize when rubbed with a magnet.

AFTER-SCHOOL PROGRAM

STEM Odyssey

MISSION: NUTRITION

SUMMARY:
Children focus on nutrition and fitness, including the essential components of a healthy diet and lifestyle. They sort life-sized food replicas according to the different food groups, and conduct hands-on experiments to improve their understanding of how food fuels our bodies. An experiment with emulsions shows them how bile helps us digest fats. At the end of the program, the children receive a Take- Home Step-O-Meter—a great fitness tool to measure the number of steps they take and monitor their healthy, active lifestyles!

EDUCATIONAL VALUE:
Children are introduced to the basics of nutrition including the role of carbohydrates, proteins, and fats. They will gain an understanding of how food provides energy for the body and how exercise plays an important role in energy levels. The program increases the children's nutritional knowledge, stimulates enthusiasm for personal health, and encourages a healthy attitude toward nutrition and fitness.

TAKE-HOME MESSAGE:
1. It is important to eat foods from each of the main groups: grains, vegetables, fruits, dairy and calcium, fats and oils, and proteins.
2. Foods have different portion sizes because of their nutrients.
3. Digestion breaks down food in our bodies to release the stored energy.

AFTER-SCHOOL PROGRAM

OPTICAL ILLUSIONS

SUMMARY:
Children explore the physics of optical illusions. They learn how our eyes can trick our brains as twisting coils move in mysterious ways, and a grid of black squares make spots appear! Children manipulate flexible mirrors and explore the world with inverted vision. Hands-on visuals provide children the opportunity to create their own illusions. Children try out classic mirror illusions in class. They also assemble the Take-Home Periscope.

EDUCATIONAL VALUE:
Children are introduced to the concepts of refraction, science of optics, and biology associated with sight. The instructor uses a wide variety of optical illusions like the mirror mirage, twisting coils, and convex and concave mirrors to demonstrate how physics can trick our eyes. Children recreate printed illusions and explore the reflections of various mirror forms.

TAKE-HOME MESSAGE:
1. Optical illusions trick our brains through our eyes.
2. A mirror can distort a reflection.
3. Lines can create optical illusions.

AFTER-SCHOOL PROGRAM

SMELLY SCIENCE

SUMMARY:
The science of scents is in the air! Children will learn about our sense of smell, and put their noses to the test as they experiment with the chemistry of aromas. From human nasal passages to animal adaptations, from enticing aromas to stinky stenches, the nose knows!

EDUCATIONAL VALUE:
This class teaches children about the anatomy and physiology of our olfactory system. They will experiment to test their own senses of smell, and learn about the connection between smell and taste. They will compare our human olfactory system with that of a dog, and also learn about a wide variety of other animal adaptations related to smell. Experiments will introduce them to the chemistry of aromatic compounds, and a common chemical reaction that gives cooking foods their delicious smell. In a STEM challenge, they will combine different fragrances to create their own signature scents.

TAKE-HOME MESSAGE:
1. Smells come from odor molecules in the air.
2. People and animals smell odor molecules with their noses.
3. Different molecules create different smells.

AFTER-SCHOOL PROGRAM

SONIC SOUNDS

SUMMARY:
Music and all sorts of merry sounds engage children in sound experiments and live demonstrations showing the properties and transmission of sound waves. Children listen to sounds made with solid materials— from plastic, to metal, to string. Ordinary objects like handheld horns, metal screws, wooden ratchets and beads transform into a story sound-effect symphony. Electronic devices reveal frequency when a pitchchanging machine alters the children's voices to gruff monsters or happy chipmunks. Children complete the class with their Sonic Horn Take-Homes.

EDUCATIONAL VALUE:
Volunteers capture the characteristics of sound concepts and sound waves by role-playing molecules to demonstrate sound wave motion. Children participate in producing and identifying acoustic sounds from a variety of materials. Electronic distortions link shifting frequencies to voice alterations. Children bring home the Sonic Horn resonance chamber.

TAKE-HOME MESSAGE:
1. Sound moves in waves.
2. Vibrations cause sounds.
3. Vibrations create different sounds.

AFTER-SCHOOL PROGRAM

WATTS UP

SUMMARY:
Children discover the world of electricity. They will see sparks fly from a Van de Graaff generator. Children make confetti levitate by creating a static field. They also tack on a wig to the Van de Graaff to generate a brilliant, hair-raising display from the repelling forces of charged atoms! Children assemble a Static Stick to Take-Home for some electron-jumping fun!

EDUCATIONAL VALUE:
Children have a solid introduction to the properties of electricity and electric charges. Children discover an electric charge's basic properties, learn to distinguish between static electricity and electrical current, and explore the science behind these phenomena. Hands-on activities provide a tactile lesson in charging and discharging objects with static electricity. Children will be able to relate a newfound understanding of lightning and static-electric shocks—that may have previously been confusing or even frightening—to their daily lives. They will learn how to protect themselves from electric shocks and lightning.

TAKE-HOME MESSAGE:
1. Static can happen when two objects touch.
2. Static happens when electrons move from one object to another.
3. Lightning rods protect tall buildings. They move lightning into the ground.