Science of Leonardo da Vinci Spring Break Camp

March 29 – April 2
Grades 2-5: 9 am – noon
Grades 6-8: 1 – 4 PM
$227 per student per camp; $210/student per camp with early registration by March 5
Location: Grades 2-5, Skyline Elementary School
Grades 6-8, Westborough Middle School
All workshops are taught by scientists

Schmahl Science Workshops' summer camps EXPLODE the myth that science is dull. Our instructors are talented scientists and engineers who engage students' curiosity, imagination and creativity using a fun, hand-on approach. Students learn to apply the scientific process as well as core scientific principles, all while making exciting new discoveries.

In this unique spring camp, students become engineers in the tradition of Leonardo da Vinci. They build clocks, take apart gadgets, design submarines, build rockets, learn about lenses and light, construct trebuchets, drop parachutes, make pinhole cameras, dissect squid and cow eyes and explore anamorphic art.

Summer Camp Workshop Descriptions

Day 1

Simple Machines: Give me a lever long enough and a place to stand, and I will move the world" said Archimedes in 230 BC. In this workshop, students learn how gears and levers make work easier.

Death by Marshmallow: Trebuchets, light artillery weapons used to throw objects, were introduced in the Middle Ages. Students build, test, and modify the throwing distance of a Trebuchet and discover how to fling a marshmallow the furthest.

Leonardo da Vinci's Legacy – Modern Clocks: In 1600, Leonardo da Vinci built a prototype of today's clock. His studies of the laws of motion led him to design a clock which uses a chain with weights and grooved wheels. In his original clock, motion was regulated by the weights. Later, the weights were replaced by a spring which once wound, provided the necessary force for motion. One of the first "time gauges," its hours were roman numerals and it had only one hand. Though wind-up clocks have been around a long time, they are fun to explore. In this workshop, students assemble their own clock.

Day 2

Squid Dissection: Not only did Leonardo da Vinci study human anatomy; he also studied the anatomy of many other animals. He dissected cows, birds, fish, monkeys and frogs, and compared their anatomical structure to that of humans. In this workshop, students learn basic dissection techniques as they perform a step-by-step exploration of the interior and exterior of a squid. They also learn about a squid's habitat, life cycle and place in the food chain.

Deep Sea Divers: Leonardo da Vinci's design for an underwater breathing apparatus consists of cane tubes joined by leather, and steel rings to prevent the tubes from being crushed by water pressure. In this workshop, students learn about flotation, air pressure and density. They build divers using balloons, paper clips, and weights and place them in a one-liter bottle for "deep sea diving." The workshop includes measurement and data collection, and generates many questions for students to explore.

For more information contact Belinda Lowe-Schmahl at (408) 281-7595 or bel@schmahlscience.org
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Water Rockets: Wear your swimsuit to this workshop! Students design and launch rockets made from 2-liter bottles.

Day 3

Paper Bridges: Paper folded or rolled into columns and beams can be surprisingly strong. By exploring the simplest types of paper bridges, students discover that they can make very strong structures using very limited materials. As they continue to take on more difficult bridging challenges and learn more about the capabilities of their materials, they discover bridge building principles.

Leonardo da Vinci Bridge: Students build a self-supporting arched bridge that doesn't require ropes or other fasteners. The bridge's own weight keeps it together. The more is that stacked on it, the more stable it gets.

Parachutes: Leonardo da Vinci said: "If a man is provided with a length of gummed linen cloth with a length of 12 yards on each side and 12 yards high, he can jump from any great height whatsoever without injury." A simple parachute will land a small payload, but how big a canopy is needed to bring a Barbie down to Earth safely? Students make parachutes using facial tissues and test the "carrying capacity" of larger ones.

Day 4

Lights and Mirrors: Leonardo da Vinci investigated optics and perception using subtle experiments that explain why the sky is blue. He argued that light has a finite velocity and travels in straight lines, and deduced the existence of a surface within the eye that receives light from a wide field of view. Students use their reflections in plastic mirrors to learn how to make a million eyes, a "tunnel" through the desk, periscopes, and how "fun house" mirrors work. A laser is used to show a light path. Concepts explored include reflection, refraction, interference, rainbows, lasers, light waves and color.

Anamorphic Art: An Anamorphic image is an extreme case of perspective, where the image is stretched beyond recognition and only appears normal when viewed from a certain point. The first known example of anamorphous was found in Leonardo da Vinci's: Codex Atlanticus c. 1485. In this unique interdisciplinary workshop, students use science, math, and art to create an image on a curved grid. The resulting image appears distorted and difficult to recognize… until it is viewed with a cylindrical mirror!

Camera Obscura: "...Here the figures, here the colors, here all the images of every part of the universe are contracted to a point. O what a point is so marvelous!" In 1490, Leonardo da Vinci wrote the first detailed description of camera obscura in his "Atlantic Codex," a 1,286-page collection of drawings and writings. The principle of camera obscura is simple: punch a hole in a dark box and put a piece of light-sensitive material on the other side and, voilà, you have a photograph.

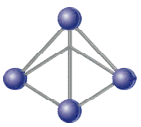
Light and Shadows; Leonardo da Vinci made a scientific study of light and shadow in nature. It dawned on him that objects were not comprised of outlines, but were actually three-dimensional bodies defined by light and shadow. Known as chiaroscuro, this technique gave his paintings the soft, lifelike quality that made previous paintings look flat like cartoons. In this workshop, students learn what differentiates opaque, translucent and transparent materials. They also learn how light travels, and how an object's shadow is affected by the intensity and position of light in relation to both the object and the surface on which a shadow is cast.

Day 5

River Erosion: The Mona Lisa is arguably Leonardo da Vinci's most widely recognized painting. That said, try to describe the painting without looking at it. The figure's ambiguous "smile" and wandering eyes probably come to mind first. But can you remember what's in the background? Behind the figure, torrents of water cascade down between dark, jagged rocks before flowing into a river that sweeps across the back of the painting and passes under a bridge. The background is straight from the Arno Valley in Tuscany, where da Vinci grew up. Students use stream tables to gain experience with models, maps, and the concepts of erosion and deposition.

Fossils: Leonardo da Vinci knew well the rocks and fossils (mostly Cenozoic mollusks) found in his native northern Italy. No doubt he had ample opportunity to observe them during his service as an engineer and artist at the court of Lodovico Sforza, Duke of Milan, from 1482 to 1499. Leonardo wrote: "Since things are much more ancient than letters, it is no marvel if, in our day, no records exist of these seas having covered so many countries…But sufficient for us is the testimony of things created in the salt waters, and found again in high mountains far from the seas." During this workshop we answer the question: how does a living thing become a fossil? Students will explore the mysterious processes by which evidence of past life is preserved. By participating in simulated sedimentary processes, students explore the mystery of fossils and fossilization.

Volcanoes, Earthquakes and Plate Tectonics: How did shells come to lie at the tops of mountains? Leonardo da Vinci's answer was remarkably close to the modern one: fossils were once-living organisms that had been buried at a time before the mountains were raised. He wrote "it must be presumed that in those places there were sea coasts, where all the shells were thrown up, broken, and divided…" Where there is now land, there was once ocean. Student use exploding hair gel, Alka Seltzer and baking soda volcanoes, Fig Newton convergent zones, Milky Way divergent zones, and plate tectonic puzzles to learn about plate boundaries, what makes some volcanoes more dangerous than others, volcanic rocks and landforms, and how volcanic eruptions affect Earth's climate and living things.



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About Schmahl Science Workshops

Schmahl Science Workshops is a non-profit partnership of students, parents, teachers, scientists and engineers who come together to foster the innate curiosity and love of science that exists among children.

Founded in 1996 by a group of four children and their parents, Schmahl Science Workshops provides pre-K through 12th grade children an unmatched breadth of hands-on science workshops spanning biology, chemistry, earth science, forensics, math and physics. Our mission is to prepare children of all backgrounds for a future in which science and technology will drive every industry and vocation.

We believe that children are motivated to learn when their ideas are cultivated through the joy of designing and carrying out an experiment. Through these authentic research experiences, our workshops enable students to explore and invent what inspires them, and to develop the skills needed to achieve success in all areas of their lives.

February 2010

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Registration Form

Child's Name_____ Grade 2009-10 _____

Child's Name_____ Grade 2009-10 _____

Child's Name_____ Grade 2009-10 _____

Parent Name_____ Email_____

(For registration confirmation)

Address_____

City _____ Zip_____

Home Phone _____ Emergency Phone_____

Any Medical issues for child(ren) _____

Workshop Series	Students' Names	# of Students	Amount Due
Grades 2-5 da Vinci Science Fee $227 per student			
Grades 6-8 da Vinci Science Fee $227 per student			
Early registration discount:$17 per student per camp			
Total due			

- **Mail registration to:** Schmahl Science Workshops, 171 Branham Ln Ste 10-223, San Jose, 95136.
- **Payment is due with registration. No refunds. No substitutions**. Send check or money order made out to Schmahl Science Workshops. Credit Card Payments: MasterCard, Visa, American Express (Circle One)
  Card Number_____ Exp. Date_____ CID _____

  Signature_____ Date_____
- Check here to be added to our mailing list of future workshops _____.
- Check here for information via email _____.
- SSW may take workshop photos for use in SSW's publicity. Names and locations will not be published. Check here if we have your permission to take photos of your children during our workshop(s)_____.
- How did you hear about us? _____

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