Science Ambassadors Presentations:

The Golden Ratio

The Golden Ratio presentation will change your view of everything ranging from iPhones to the spiral formation of hurricane winds. Students will finally realize that math is applicable. In fact, the golden ratio governs everything around us and even in our own DNA molecules. Students will also learn how to measure and calculate ratios in various hands-on activities – measuring each other's arm spans, heights, etc. and using image-editing software on a laptop to achieve the golden ratio in various photos. By applying mathematical concepts, we can open up possibilities toward advancements in all career fields and industries. Overall, the ideas presented can potentially change the students' views of mathematics as not a theoretical field but a truly applicable, fascinating, and interdisciplinary field.

Key Words: golden ratio, math, everyday applications, biology, art, music, nature, image-editing software

Bioluminescence

In our bright presentation of bioluminescence, we explore the natural phenomenon of light in organisms in our natural world. We discuss primarily the chemical science behind this light, and then discuss evolutionarily why some of these organisms have bioluminescence-- and how they've evolved to use their light effectively. Lastly, we discuss how scientists today have studied and tried to harness this natural source of light for a form of natural energy.

Our activity will involve the use of kits of fireflies and ATP, and also glowing bacteria. The class will be split in half, with one half doing the fireflies and the other doing the bacteria. The firefly kit allows students the opportunity to observe the chemical interaction that allows fireflies to communicate, and also what sort of chemicals cause changes that can regulate their flashes. Students will mix a pre-made buffer solution, ATP powder, and firefly powder and watch it glow. They will then add acid, bases and salt solutions to see how it affects the glow.

The bacteria activity involves a premade bacteria culture, which students will take a sample of and try to cultivate in their own petri dishes. This activity will be left in the teachers care after presenters have left to give the bacteria the opportunity to cultivate and glow properly. Disposal procedures for the petri dishes will be included in another document.

Keywords: energy efficiency, bioluminescence, chemistry, biology, fish, bacteria, light, energy, electrons, chemical reaction, finding Nemo, evolution, fireflies, ATP.

Frozen and Particle Simulation

This presentation discusses the basics of particle simulation, using examples from the recent Disney film Frozen. Topics covered include why snow is particularly difficult to simulate (with an accompanying activity), a specific method of particle simulation, and how particle simulation is used in various scientific fields. The presentation focuses specifically on the mathematics and computer science behind particle simulation, and various applications outside of entertainment. The accompanying activity will allow students to explore a particle simulation and change various constraints to understand how changing

inputs changes the final product.
Key Words: computer science, math, particle simulation

Color and the Mind
This presentation discusses how humans perceive color, and the effects that vision has on human health.
Keywords: Color, Perception, Vision, Light, Eye, health Sleep

Infectious Diseases
In this presentation, students learn about infectious diseases, how they spread, and how vaccines can limit their reach. Differences between bacterial and viral infections are explored. The activity demonstrates how easily diseases can spread doing everyday activities such as going to school or visiting the grocery store. Cups of seltzer and tonic water, syringes, and a black light are used to simulate this.
Keywords: biology, diseases, vaccines, linear and exponential growth, viral, bacterial