FAMILY ENGINEERING SCIENCE NIGHT

OUTREACH PRE-VISIT PAGE ALL AGES

Family Engineering Science Night is designed to increase public understanding and appreciation of the role engineering plays in everyday life. **Family Engineering** promotes creative problem solving, teamwork, and communication, as well as introduces families to the variety of exciting careers available in engineering. Arizona Science Center will be arriving no later than one hour before the start of your **Family Engineering Science Night**. Arizona Science Center staff will be bringing hands-on activities, all focusing on different aspects of engineering and family teamwork. Activities will include a combination of the following:

Openers

- **Against the Wind:** Explore how engineers design cars to be more aerodynamic by altering the design of a car to make it go slower or faster down a ramp in your very own wind tunnel!
- **Thrill Seekers:** Work as a team to create your very own roller coaster! See how many loops and twists you can add to make the most thrilling ride.
- **Domino Diving Board:** Challenge yourself! See how far you can build a cantilever bridge out of dominos off a book before it collapses!
- **Learning from Failure:** Another challenge! Design a boat out of a piece of foil and see how many pennies your design can hold before sinking! Try making changes to you boat to see if you can improve your design and penny-holding capacity!
- **Let's Communicate:** Sometimes communicating is harder than we think! In pairs within your family, act as an engineer communicating a design to a builder to create a structure using just words - neither of the partners can see the other's design until the end!
- **Make It Loud:** Compare how different materials can make sounds louder or softer and explore why this is important for us every day!
- **Tumbling Tower:** A twist on the classic game of Jenga, use cardboard tubes and squares to build a tower. Then remove the tubes one at a time without the tower falling down!
- **Inspired by Nature:** Engineers often get great ideas from nature when designing new things. See if you can match up some examples of human inventions to their nature-inspiring counterparts.
- **Your Foot My Foot:** Accurate measurement is essential when designing and building products, but all feet are not made equally! Explore why it is important to use standard units when measuring and engineering.
- **Showerhead Showdown:** Compare how water flows out of normal vs. "low-flow" shower heads, and why engineers are working on this. A very important invention – especially for us in the desert!

- **Boxing Beans:** Try and fit as many beans as you can in boxes of different shapes and sizes to see why engineers might use one shape instead of another.

- **What Do Engineers Do:** There are a lot of misconceptions about engineers and what they do. Debunk these myths as a family and learn what an exciting field engineering can be!

PROGRAM NEEDS

- Eight tables set up in a large open area
- Water source readily available with the capacity to fill up large containers (i.e. a deep sink)
- Eight or more adult volunteers available 30 minutes before the event; at least one to facilitate each activity

SCIENCE STANDARDS

Grade 3: S1C1PO1: Formulate relevant questions about the properties using observations and prior knowledge.
S1C2PO3: Conduct simple investigations.
S1C3PO2: Construct reasonable interpretations of the collected data based on formulated questions.
S1C4PO1: Communicate investigations and explanations using evidence and appropriate terminology
S3C2PO1: Identify ways that people use tools and techniques to solve problems

Grade 5: S1C1PO1: Formulate a relevant question through observations that can be tested by an investigation
S1C2PO3: Conduct simple investigations
S1C3PO2: Analyze whether the data is consistent with the proposed explanation that motivated the investigation
S1C4PO1: Communicate the results of an inquiry
S3C2PO1: Describe the relationship between science and technology

Grade 8: S1C1PO1: Formulate questions based on observations that lead to the development of a hypothesis.
S1C2PO3: Conduct a controlled investigation to support or reject a hypothesis
S1C3PO2: Form a logical argument about a correlation between variables or sequence of events
S1C4PO1: Communicate the results of an investigation
S3C2PO1: Propose viable methods of responding to an identified need or problem

MATH STANDARDS

Grade 3: 3.MP.1. Make sense of problems and persevere in solving them.
3.MP.5. Use appropriate tools strategically.

Grade 5: 5.MP.1. Make sense of problems and persevere in solving them.
5.MP.5. Use appropriate tools strategically.

Grade 8: 8.MP.1. Make sense of problems and persevere in solving them.
8.MP.5. Use appropriate tools strategically.