Pre and post-visit activities for *Dream Big* Field Trip Package

An engineering and creative problem-solving lesson for 3rd through 12th grade

Learning Goals (for field trip and pre/post-activities)

Dream Big is an engineering field trip package designed for students in 3rd through 12th grade. Through pre-visit, field trip, and post-visit activities, students will:

1. Follow and understand the scientific/creative process.
2. Create knowledge through tactile engagement and making.
3. Stimulate creativity and cultivate interest in engineering and inventive fields.
4. Foster collaboration, communication and teambuilding amongst peers and facilitators, to encourage community.
5. Encourage students to participate in learning to support lifelong mission of erudition.
6. Work collaboratively with peers on a design project.

Standards Addressed

Missouri Learning Standards, Science

- MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- ETS1.B: Developing Possible Solutions. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.
- MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Common Core Standards

- 6-8-PS2-1: Apply physics principles to design a solution that minimizes the force of an object during a collision and develop an evaluation of the solution.
- 6-8-PS2-2: Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- 6-8-PS3-2: Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.
- 6-8-PS3-5: Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

Pre-visit Activities

Before coming to the Science Center, consider doing some of the following activities to prepare your class for the field trip.

- Watch the film trailer on YouTube: https://www.youtube.com/watch?v=8lr2S4n7Etk
    - Have a class discussion about what students know about engineering, teamwork, and creative problem solving
- Make Mini Rube Goldberg:
    - Provide Definition and Context:
        - A Rube Goldberg Machine is complicated machine that completes a simple task. This notion was first thought of by a man named Reuben Garrett Lucius Goldberg, an American cartoonist, who would draw these detailed contraptions for newspapers in the early 1900's.
        - Build a contraption out of 10 or more school supplies to turn a page in a book.
        - Break students into equal groups and create machines.
- Draw a Rube Goldberg Machine:
        - Students work independently to illustrate a functional Rube Goldberg and label energy transfers/Newton's Laws.
        - Create simple tasks to accomplish and assign to students. This approach will allow the students to think backwards through the design process.
        - Have students label areas of energy stores, energy transfers, and or Newton's Laws.
        - Students are encouraged to share projects to the class.

Post-visit Activities

After your field trip, remember your experience and extend the learning by submitting a Rube Goldberg Video.

- Create an EPIC Classroom Rube Goldberg and submit video to be featured on SLSC's social media.
    - Needed Materials: Anything and everything from the classroom to create the machine and a phone or camera
    - Create the device and record
    - Submit video to: Trent.Smith@slsc.org