First Grade

Suggestion: Prior to introducing students to their first engineering design challenge, it is recommended that teachers begin with the following two *model lessons:

- Technology all Around Us
- Engineering is in the Design

These model lessons have been prepared to introduce students to the engineering design process referenced in the following engineering standards:

Listed are Engineering Design K-2 ETS 1:

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

(ETS=Engineering, Technology, and Applications of Science)

In addition, in working with ETS1 the Science and Engineering Practices are an important part of the engineering design process:

1. Asking Questions (for science) and Defining Problems (for engineering)
2. Developing and Using Models
3. Planning and Carrying Out Investigations
4. Analyzing and Interpreting Data
5. Using Mathematics and Computational Thinking
6. Constructing Explanations (for science) and Designing Solutions (for engineering)
7. Engaging in Argument from Evidence
8. Obtaining, Evaluating, and Communicating Information

(*Model Lessons-are sample lessons that have been fully developed using the engineering design process)

Engineering Extensions in Elementary Science

Suggested Engineering Extension Lessons for First Grade Classrooms						
Grade	**Strand**	**FOSS CA Module**	**Standards**	**Engineering Extensions**	**Science Connection**	**Notes**
1	Earth Science 8 Weeks	Air and Weather	ETS1.A ETS1.B ETS1.C	Challenge • Make a balloon-powered carrier that transports materials across a given distance. Focus Question • What scientific knowledge do you need to know about air in order to meet this challenge?	**Scientific Knowledge**: • Air can be compressed. • Compressed air increases pressure. • Releasing compressed air propels objects in the opposite direction.	Once students have completed: FOSS CA – Air & Weather Investigation 1 (Parts 1-6) Students will have enough content knowledge to engage in the **Balloon Powered Carrier Challenge**.
1	Physical Science 8 Weeks	Solids and Liquids	ETS1.A ETS1.B ETS1.C	Challenge • Design a kazoo that will sound like a real kazoo. Focus Question • What scientific knowledge do you need to know about air in order to meet this challenge?	**Scientific Knowledge**: • The properties of solid objects have distinct uses. • *Sound can make matter vibrate, and vibrating matter can make sound.	Once students have completed: FOSS CA – Solids & Liquids Investigation 4 (Parts 1-4) FOSS CA – Air & Weather Investigation 1 (Parts 1-4) Students will have some of the content knowledge to engage in the **Let's Make a Kazoo Challenge**. The lesson provided will help students bridge to the concept of sound. **(*MODEL LESSON)**
1	Life Science 12 Weeks	Plants and Animals	ETS1.A ETS1.B ETS1.C	Challenge • Design a terrarium that will grow your sprouted seeds into a plant with roots, stems, and leaves. Focus Question • What scientific knowledge do you need to know about plants in order to meet this challenge?	**Scientific Knowledge**: • Plants and animals live in different environments. • They have structures that function in growth and survival	Once students have completed: FOSS CA – Plants & Animals Investigation 1 (Parts 1-3) Investigation 2 (Parts 1-3) Investigation 3 (Parts 1-3) Students will have enough content knowledge to engage in the **Create a Home for Your Plant Challenge**.

*(*Model Lessons-are sample lessons that have been fully developed using the engineering design process)*
The Engineering Challenges listed in the table can be designed as extensions of the specified FOSS Investigations

Suggested Lesson Sequence for Engineering Extensions for 2017-2018				
Grade	**Trimester**	**Lesson**	**Purpose**	**Location**
1	1	**Technology All Around Us**	**Introduction to Technology:** This is an introductory lesson to engineering. It provides students a basic understanding of what technology is and how it impacts engineering.	Technology Lesson
1	2	**Engineering is in the Design**	**Introduction to Engineering:** This is basic lesson introducing the Engineering Design Process (EDP) for elementary engineering. The EDP is foundational for students to understand how to design and test engineering solutions like real engineers.	Engineering Design Lesson
1	3	**Let's Make a Kazoo Challenge** **OR**	**Model Engineering Lesson:** This follows the Solids and Liquids FOSS CA Physical Science Module and provides an example of how to extend from a science unit into an engineering unit.	1st Grade Model Engineering Lesson
		Other FOSS CA Engineering Extensions	**EDP Lesson Template:** This can be used to extend the other FOSS CA connections listed on page 2 into an engineering unit.	EDP Template