



## Engineering Extensions in Elementary Science

### Third 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 below are Engineering Design Standards 3-5 ETS 1**

**ETS1.A: Defining and Delimiting Engineering Problems**

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

**ETS1.B: Developing Possible Solutions**

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.

**ETS1.C: Optimizing the Design Solution**

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

(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 Third Grade Classrooms

Grade	Strand	FOSS CA Module	Standards	Engineering Application	Science Connection	Notes
3	Earth Science 8 Weeks	Sun, Moon, & Stars	ETS1.A ETS1.B ETS1.C	<p>Challenge</p> <ul style="list-style-type: none"> <li>Design a sundial that can be used by the whole school.</li> </ul> <p>Focus Question</p> <ul style="list-style-type: none"> <li>What scientific knowledge do you need to know about the sun to complete this challenge?</li> </ul>	<p><b>Scientific Knowledge:</b></p> <ul style="list-style-type: none"> <li>The Sun rises in the east and sets in the west.</li> <li>Shadows are the areas of darkness created when an opaque object blocks light.</li> <li>The shapes of shadows change over a day and depend on the position of the sun in the sky.</li> </ul>	<p>Once students have completed: FOSS CA – Sun, Moon, &amp; Stars Investigation 1 (Parts 1-2)</p> <p>Students will have enough content knowledge to engage in the <b>Designing a School Sundial Challenge</b>.</p>
3	Physical Science 9 Weeks	Matter and Energy	ETS1.A ETS1.B ETS1.C	<p>Challenge</p> <ul style="list-style-type: none"> <li>Design a toy that wobbles when it moves using a type of energy.</li> </ul> <p>Focus Question</p> <ul style="list-style-type: none"> <li>What scientific knowledge do you need to know about the different forms of energy to complete this challenge?</li> </ul>	<p><b>Scientific Knowledge:</b></p> <ul style="list-style-type: none"> <li>Energy can be used to move an object.</li> <li>Objects in contact exert forces on each other.</li> </ul>	<p>Once students have completed: FOSS CA – Matter &amp; Energy Investigation 1 (Parts 1-3)</p> <p>Students will have enough content knowledge to engage in the <b>Designing a Toy That Moves from Here to There Challenge</b>.</p> <p>(*MODEL LESSON)</p>
3	Life Science 10 Weeks	Structures of Life	ETS1.A ETS1.B ETS1.C	<p>Challenge</p> <ul style="list-style-type: none"> <li>Design a seed dispersal model of seeds in your community.</li> </ul> <p>Focus Question</p> <ul style="list-style-type: none"> <li>What scientific knowledge do you need to know about seed dispersal to complete this challenge?</li> </ul>	<p><b>Scientific Knowledge:</b></p> <ul style="list-style-type: none"> <li>Reproduction is essential to the continued existence of every kind of organism.</li> <li>Some organisms survive and reproduce or move to new locations.</li> </ul>	<p>Once students have completed: FOSS CA – Structures of Life Investigation 1 (Parts 1-3)</p> <p>Students will have enough content knowledge to engage in the <b>Designing a Seed Dispersal Tool Challenge</b>.</p>

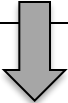
(\*Model Lessons-are sample lessons that have been fully developed using the engineering design process)

The Engineering Challenges listed in the table can be designed as extensions of the specified FOSS Investigations



## Engineering Extensions in Elementary Science

### Suggested Lesson Sequence for Engineering Extensions for 2017-2018

Grade	Trimester	Lesson	Purpose	Location
3	1	Technology All Around Us	<b>Introduction to Technology:</b> This is an introductory lesson to engineering. It provides students a basic understanding of what technology is and how it impacts engineering.	<a href="#">Technology Lesson</a>
3	2	Engineering is in the Design	<b>Introduction to Engineering:</b> This is a 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.	<a href="#">Engineering Design Lesson</a>
3	3	Design a Toy That Moves From Here to There	<b>Model Engineering Lesson:</b> This follows the Matter and Energy FOSS CA Physical Science Module and provides an example of how to extend from a science unit into an engineering unit.	<a href="#">3<sup>rd</sup> Grade Model Engineering Lesson</a>
		OR  Other FOSS CA Engineering Extensions	<b>EDP Lesson Template:</b> This can be used to extend the other FOSS CA connections listed on page 2 into an engineering unit.	<a href="#">EDP Template</a>