



Engineering Extensions in Elementary Science

Second 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 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)



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Suggested Engineering Extension Lessons for Second Grade Classrooms

| Grade | Strand | FOSS CA Module | Standards | Engineering Application | Science Connection | Notes |
|-------|-----------------------------|-----------------------|----------------------------|---|---|--|
| 2 | Earth Science 9 Weeks | Pebbles, Sand, & Silt | ETS1.A ETS1.B ETS1.C | Challenge <ul style="list-style-type: none"> Create a model of the “Three Little Pigs” houses using sand, soil, and plant material. Focus Question <ul style="list-style-type: none"> What scientific knowledge do you need to know about the properties of natural resources to complete this challenge? | Scientific Knowledge: <ul style="list-style-type: none"> People use rocks as natural resources to construct objects and to make useful materials. | Once students have completed: FOSS CA – Pebbles, Sand, & Silt Investigation 2 (Parts 1-4) Investigation 3 (Parts 1-5) Students will have enough content knowledge to engage in the Designing Homes for the Three Little Pigs Challenge . |
| 2 | Physical Science 9 Weeks | Balance and Motion | ETS1.A ETS1.B ETS1.C | Challenge <ul style="list-style-type: none"> Design a marble rollercoaster Focus Question <ul style="list-style-type: none"> What scientific knowledge do you need to know about spheres and gravity to complete this challenge? | Scientific Knowledge: <ul style="list-style-type: none"> The stability of an object on a surface depends on the position of the center of gravity. Different materials have observable properties. | Once students have completed: FOSS CA – Balance & Motion Investigation 3 (Parts 1-3) Investigation 4 (Parts 1-3) Students will have enough content knowledge to engage in the Engineering a Marble Rollercoaster Challenge . |
| 2 | Life Science 12 Weeks | Insects and Plants | ETS1.A ETS1.B ETS1.C | Challenge <ul style="list-style-type: none"> Design a plant container that will grow a seed into a plant. Focus Question <ul style="list-style-type: none"> What scientific knowledge do you need to know about plants to complete this challenge? | Scientific Knowledge: <ul style="list-style-type: none"> Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. | Once students have completed: FOSS CA – Insects and Plants Investigation 2 (Parts 1-3) Students will have enough content knowledge to engage in the Create a Home for Your Plant Challenge (*MODEL LESSON) |

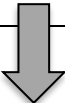
(*Model Lessons-are sample lessons that have been fully developed using the engineering design process)

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



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Suggested Lesson Sequence for Engineering Extensions for 2017-2018

| Grade | Trimester | Lesson | Purpose | Location |
|-------|-----------|---|--|---|
| 2 | 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 |
| 2 | 2 | Engineering is in the Design | Introduction to Engineering: 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. | Engineering Design Lesson |
| 2 | 3 | The Engineering a Marble Rollercoaster Challenge | Model Engineering Lesson: This follows the Balance and Motion FOSS CA Physical Science Module and provides an example of how to extend from a science unit into an engineering unit. | 2nd Grade Model Engineering Lesson |
| | | OR  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 |