BIRDEE Unit 1 Lesson Plans

1.3.3. Understanding Existing Engineering Systems with SFM

Students will understand what a system is and how to analyze a system using SFM. Students will understand that SFM is a tool. Students will understand how SFM is used in engineering and why it is helpful when analyzing systems. Students will use SFM to analyze thermal regulation systems.

Teacher Note: If available, provide each table/group with a screw and a nail for this lesson.

Engage/Hook: 5 min *(Class Discussion)*

View: Is a Screw a System?
Teachers will provide a screw and a nail to each student. Look at both of the objects.

- Is a screw a system? (allow students to discuss…most students will say no, but the answer is yes) Click the slide to view the explanation - **A set of things working together as parts/components of a mechanism or an interconnecting network**
- Most students will see the screw as one thing - it is actually 5 different parts that work together. This will be explained in the mini lesson below.

Explain: 20 min *(Guided Presentation)*
Mini Lesson
View: 1.3.3. SFM: Understanding a System
Today we will be learning more about the Structure, Function, and Mechanism (SFM) of systems and how SFM helps us to understand engineering systems using a screw as the example. ***(Teacher Note: NGSS crosscutting concept)***

- **Screw vs Nail Analysis: 3 min**
  - You will use 1.3.3 SFM Analysis of a Nail to *independently* practice SFM analysis on a nail. (Slide 10)
  - **Class Discussion:** Teacher will discuss answers with students. (Slide 11)
  - **Class Discussion:** Complete Holding Objects Together as a group.

Explore: 20 min *(Individual and with Elbow Partner)*

SFM Thermal Regulation Systems

View: 1.3.3. Using SFM to Understand Thermal Regulation Systems

SFM can help us understand our client's problem by analyzing different thermal regulation systems. Thermal regulation means maintaining a given temperature of an object for a period of time when the surrounding temperature is different. Analyzing existing thermal regulation systems

Student Handouts:

1.3.3 SFM Analysis of a Nail

1.3.3 SFM Analysis of Thermal Regulation Systems

Student Materials:

1.3.3. Using SFM to Understand Thermal Regulation Systems

Instructional PPT's & Materials:

Is a Screw a System?

1.3.3. SFM: Understanding a System

1.3.3. Using SFM to Understand Thermal Regulation Systems

(Extend) 1.3.3. SFM Extension: Fixed Pulley

(Extend) 1.3.3. SFM Extension: Water Faucet

Teacher Resources:

N/A

Web Resources:

N/A

may help us come up with ideas on how to help our client keep their meals at the correct and stable temperature. ● You will use the **1.3.3 SFM Analysis of Thermal Regulation Systems** handout: ○ Choose 2 examples of thermal regulation systems from the Thermal Regulation Systems slides. ○ For each example, fill out the organizer with the structure, function, and mechanism. ○ After completing your own SFM analysis of two thermal regulation systems, discuss with your elbow partner and add to your SFM notes. **Extend: (optional)** **1.3.3. SFM Extension: Fixed Pulley** **1.3.3. SFM Extension: Water Faucet**	