

Engineering Design

Lesson Overview

Objectives:

1. To identify the steps of the engineering design process.
2. To apply the steps of the engineering design process to design problems.
3. To use the engineering design process to critically think through problems and design a solution.

Class 1

Essential Questions:

1. What is the purpose of the engineering design process?
2. What are the steps of the engineering design process?

Step 1: Consider the following questions and share your answers with the class.

- What is a question you have and do not know the answer?
- Can your question be answered with design?

Step 2: Access the **Action Plan**, **Vocabulary Handout** and **Key Concepts**.

- The **Action Plan** lays out a list of tasks for you to complete during the lesson.
- The **Vocabulary Handout** is a list of terms used throughout the lesson.
- The **Key Concepts** is an outline which identifies the main ideas presented in the lesson which you can fill in to aid in note taking during the lesson.

Step 3: View the **Engineering Design** video segment.

- This video is 17 minutes long.
- Be sure to utilize the **Key Concepts** for this segment of the lesson.

Step 4: Begin the **Collaborative Brainstorming Activity**.

- Work in groups to brainstorm and sketch a solution to a problem.

Step 5: Submit the **Collaborative Brainstorming Activity**.

Class 2

Essential Questions:

1. What is the purpose of the engineering design process?
2. What are the steps of the engineering design process?

Step 1: In groups of two, imagine your partner missed the previous class. Explain the engineering design process to your partner from memory.

Step 2: Review the **Research Methodology Student Handout**.

- This handout describes the components, steps and process of research methodology.

Step 3: Review the **Assessing Risks & Benefits Student Handout**.

- The handout will provide additional information necessary to complete the **Conceptualizing Solutions Activity**.

Step 4: Complete the **Conceptualizing Solutions Activity**.

- Complete the first four steps of the engineering design process by identifying a problem and following the steps in order to conceptualize a design solution.

Step 5: Begin the **Turning Ideas into Reality Project**.

- Complete the remaining steps of the engineering design process from the **Conceptualizing Solutions Activity**.

Step 6: Provide an update on your project.

Class 3

Step 1: Review the **Reverse Engineering Student Handout**.

- This handout provides a structured guide to understanding, analyzing and documenting a product's design, functionality and structure through reverse engineering.

Step 2: Continue the **Turning Ideas into Reality Project**.

- Complete the remaining steps of the engineering design process from the **Conceptualizing Solutions Activity**.

Step 3: Write down the remaining steps to complete your project and turn in.

Class 4

Step 1: Review for the assessment.

Step 2: Complete the **Engineering Design Assessment**.

- The Assessment is a comprehensive assessment covering material throughout the entire lesson.

Step 3: Complete the **Turning Ideas into Reality Project**.

- Complete the remaining steps of the engineering design process from the **Conceptualizing Solutions Activity**.

Step 4: Provide one thing you learned during the lesson.

Class 5

Step 1: Discuss a design you are impressed with which would have utilized the engineering design process.

Step 2: Complete the **Design Reflection Project**.

- Develop a paper reflecting on your group's design from the **Turning Ideas into Reality Project**.

Step 3: Submit the **Design Reflection Project**.