Unit 1: The Engineering Design Process

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **15 days**
Status: **Published**

Summary

In this unit students will be introduced to the Engineering Design Process. Students will learn about its steps and how this process is used in the field of engineering. The concepts of following a procedure and iteration will be discussed and students will finish the unit with the completion of several design challenges that will provide them with the opportunity to work through the process in its entirety. Students will complete design challenges that solve problems related to human need with the need to think critically.

Revised July 2026

L.SS.7.1	Demonstrate command of the system and structure of the English language when writing or speaking.
9.2.8.CAP.1	Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest.
L.KL.7.2	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
L.VL.7.3	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, including technical meanings, choosing flexibly from a range of strategies.
TECH.K-12.1.4.a	know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
TECH.K-12.1.4.b	select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
TECH.K-12.1.4.c	develop, test and refine prototypes as part of a cyclical design process.
TECH.K-12.1.4.d	exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
9.2.8.CAP.18	Explain how personal behavior, appearance, attitudes, and other choices may impact the job application process.
8.1.8.AP.6	Refine a solution that meets users' needs by incorporating feedback from team members and users.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.ED.3	Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).
8.2.8.ED.4	Investigate a malfunctioning system, identify its impact, and explain the step-by-step process used to troubleshoot, evaluate, and test options to repair the product in a collaborative team.
8.2.8.ED.5	Explain the need for optimization in a design process.

8.2.8.ED.6	Analyze how trade-offs can impact the design of a product.
8.2.8.NT.1	Examine a malfunctioning tool, product, or system and propose solutions to the problem.
MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Essential Questions/Enduring Understandings

Essential Questions:

Why is it important to have a plan when undertaking a problem?

How have developments and changes in technological design impacted our world?

Enduring Understandings:

Technology is the human process of finding solutions to solve problems and meet needs.

The process of design in engineering is one that does not end.

Objectives

Students will know that the engineering design process is cyclical in nature.

Students will know how to identify constraints in a design problem.

Students will know vocabulary as it applies to the Engineering Design Process.

Students will be skilled at demonstrating safe work habits when using tools, equipment, and technical processes.

Students will be skilled at explaining the role of troubleshooting, research and experimentation with regards to design.

Students will be skilled at explaining the reasoning behind their design.

Students will be skilled at using this process to solve a problem in technology.

Learning Plan

Steps of the Engineering Design Process: The teacher will present information including the definition of technology, engineering, and the 8 steps of the Engineering Design Process. Students should complete guided notes and/or document the information by completing a Google Slide, worksheet, or similar activity highlighting the steps of the process. The teacher will lead a discussion on how this process is used in engineering. Concepts may be supported through showing videos that explain the process and how it has been used by engineering throughout history.

Overview of Design Challenge: The students will be provided with an overview of the unit's design challenges to establish understanding of the problem, its constraints, materials, and how the Engineering Design Process will be utilized. Students will be provided with a paper or online document where the steps taken to complete the process will be documented throughout the completion of the unit. Projects may include creating a Catapult or Bucket Tower, or similar.

Design Challenge Prototype and Completion: The students will work individually or in small groups to identify the problem/need, research, design, build, and test a prototype. Challenges may include: Building a Catapult, Bucket Tower, or similar. The teacher will oversee the process, encouraging iteration throughout and supplying materials.

Evaluation and Redesign: Following testing, the teacher will guide students through the process of thinking critically to conduct a self-evaluation and a written redesign of their solution.

Assessment

Formative Assessments:

Google Forms

Guided notes

Engineering Notebook

Brainstorming Sketches

Benchmark Assessments:

Design Challenge Documentation

Design Challenge Prototype

Summative Assessment:

Evaluation and Redesign written assignment/Google Form

Alternate Assessment:

Checklist

Questioning

Discussion

Integrated Accommodation and Modifications

See attached document:

https://docs.google.com/spreadsheets/d/1bW0L5xhslCD9IsWWnzfbMJoRUI5vOFrgbQJ2saYTgLU/edit?usp=sharing