Unit 3: Technology in Space

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **10 days**
Status: **Published**

Summary of Unit

In this unit students are provided with an overview of how technology is used in space travel and exploration, as well as how it may impact the future. Students will utilize the Engineering Design Process as they work to design technologies utilized in space to test, which may include rockets, moon landers and space grabbers. Students will work collaboratively to identify the problem/need, design, problem solve, and utilize available resources to enhance their understanding of the exploration of our universe and how it is affected by technology.

Revision Date: 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.
3.3	Demonstrate an understanding of the need for mutual respect when viewpoints differ
5.2	Utilize positive communication and social skills to interact effectively with others
9.2.8.CAP.15	Present how the demand for certain skills, the job market, and credentials can determine an individual's earning power.
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.ED.7	Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).
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-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Essential Questions/Enduring Understandings

Essential Questions:

How does technology affect space exploration?

How does the exploration of our universe impact our lives on Earth?

How is the Engineering Design Process used in this area?

Enduring Understandings:

Technology is constantly changing to meet our wants and needs.

Technology has had a significant impact on space travel and exploration.

Objectives

Students will know that technology is defined as the human quest for solutions.

Students will know that the exploration of space dates back many years.

Students will know that the exploration of our universe impacts us on Earth.

Students will know that the three main forces that affect a space transportation system are drag, thrust, and weight.

Students will know that technology changes based on our wants and needs.

Students will know that there are different areas of technology.

Students will be skilled at identifying technologies present in our universe including those on our planet, on Mars, and in orbit.

Students will be skilled at identifying potential reasons why people want to travel to space.

Students will be skilled at giving examples of what the future may hold for space travel.

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

Learning Plan

Overview of Design Challenge: Students will be provided with an overview of the unit's design challenge 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.

Engineering and Aerodynamics: Teacher will provide students with an overview of the forces of aerodynamics that will affect their space transportation system including drag, lift, and thrust.

Design Challenges :

Rocket Fin, Nose Cone, and Rocket Design: Students will brainstorm ideas for potential rocket fin and nose cone designs that could be utilized on a rocket and/or model rocket. The teacher will provide models of streamlined fins and explain how aerodynamics will affect a rocket's flight depending on this factor. The concept of mass and its impact on a rocket's flight will be discussed, as well as how Newton's Laws are seen in rocket launches. Students may use Tinkercad or similar CAD program/website to design fins and nose cones that may be constructed using classroom materials or printed on a 3D printer and used to build and launch a rocket. Sketches/designs chosen should be documented and explained. If time permits, students may be given the opportunity to decorate their rocket tubes and launch rockets.

Moon/Mars Lander Challenge: Students will be given the challenge of designing a Moon/Mars Lander that will help their astronauts to land safely. The teacher will provide students with the design brief, constraints, and materials needed, as well as documentation materials. Students will work individually or collaboratively to problem solve and design their lander that will be tested, evaluated, and redesigned following testing.

Space Grabber Challenge: Students will be given the challenge of designing a Space Grabber that will allow them to collect space samples. The teacher will provide students with the design brief, constraints, and materials needed, as well as documentation materials. Students will work individually or collaboratively to problem solve and design their lander that will be tested, evaluated, and redesigned following testing.

Assessment

Formative Assessments:

Google Forms

Guided notes

Engineering Notebook

Benchmark Assessments:

Rocket Design Challenge

Moon Lander Design Challenge

Space Grabber Design Challenge

Summative Assessment:

Unit Quiz

Alternate Assessment:

Checklist

Discussion

Materials

Guided note packets/Google Docs (teacher developed)

Technology (student & teacher laptops, SmartBoard, document camera)

Google Slides/PowerPoints

Worksheets/notes

YouTube links

Safety Equipment

3D Printer

Filament

Paper cups

Marshmallows

Ping Pong Balls

Straws

Rubber Bands

Index Cards

Glue

Tape

Rocket Body Tubes

Paint

Paintbrushes

Markers

Glue

AP Launcher

Stopwatch

Paper

Integrated Accommodation and Modifications

See attached document:

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