Unit 3: Technology in Space

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **15 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 vehicles to test, which may include rockets and moon landers. Students will work collaboratively to 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 2021

Standards

LA.W.8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
LA.W.8.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
LA.W.8.2.E	Establish and maintain a formal style/academic style, approach, and form.
LA.W.8.2.F	Provide a concluding statement or section that follows from and supports the information or explanation presented.
LA.W.8.4	Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
LA.W.8.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
SCI.MS.ETS1.A	Defining and Delimiting Engineering Problems
SCI.MS.ETS1.B	Developing Possible Solutions
SCI.MS.ETS1.B	Developing Possible Solutions
SCI.MS.ETS1.B	Developing Possible Solutions
SCI.MS.ETS1.B	Developing Possible Solutions
SCI.MS.ETS1.C	Optimizing the Design Solution
SCI.MS.ETS1.C	Optimizing the Design Solution

SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.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.
SCI.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.
WRK.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.
WRK.9.2.8.CAP.15	Present how the demand for certain skills, the job market, and credentials can determine an individual's earning power.

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 both positive and negative effects on our lives, the planet, and changes in climate..

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.

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.

History of Space Travel: Teacher will provide students with information about the history of space exploration and travel, including its earliest origins in Chinese rockets and Robert Goddard's liquid fueled rockets. Students should watch videos to enhance lesson content and will complete guided notes activities.

Engineering and Aerodynamics in STS Design: 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. Teacher will provide models of streamlined fins as well as fins with a high pressure drag 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 could be printed on a 3D printer and used to build and launch a rocket. Sketches/designs chosen should be copied and explained in documentation packet/doc. 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. 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

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