Unit 6: Structures and Mechanics

Content Area: **Technology**
Course(s):
Time Period: **November**
Length: **2 weeks**
Status: **Published**

Enduring Understandings

- Structures are made of various components that are carefully designed and configured by engineers to withstand loads.
- Structures are designed for a purpose.
- Simple machines are often utilized in mechanical systems.
- Complex machines are made of two or more simple machines.
- Engineering is applied physics.

Essential Questions

- What role does math play in the development of structures and mechanical systems?
- How does engineering differ from science?
- What are loads to structures?
- How do loads effect designs?
- What are simple and complex machines?
- What roles do they play in mechanical systems?

Content

Skills

- Students will be able to identify applicable loads on structures.
- Students will be able to create a structural model.
- Students will be able to create a mechanical system utilizing simple machines.

Suggested Activities: Bridge/Tower Design & Construction, Architectural Model, Rube Goldberg Machine, Automaton Design & Construction

Resources

Resources:

1. PC or Laptops with internet access, able to run TinkerCAD (or similar program) and the various 3D printer software platforms.

2. TinkerCAD (or other equivalent solid modeling program). TinkerCAD is a free, web-based 3D modelling application which allows users to create objects utilizing constructive solid geometry applications.

3. 3D Printers allow students to realize their designs by producing physical objects from their three-dimensional digital models.

4. Engineers scales allow students to measure items graphically depicted within technical drawings and physical objects according to a set scale.

5. AutoCAD is a computer-aided design (CAD) and drafting program used for producing 2-D and 3-D technical drawings.. AutoCAD is considered an industry standard and was developed and marketed by Autodesk Inc. A free version is available for education.

6. Autodesk Design Academy https://academy.autodesk.com/ , supports educators by providing free, authentic project based learning guides and supporting videos.

7. Monmouth County Executive Airport locally positioned in Wall Township, New Jersey, is a potential location for an authentic learning experience through a field trip, supporting the Exploring Flight unit.

8. Consumable Materials such as bass and balsa wood, foam, hot glue, project kits, aluminum foil, wax paper, balloons, fishing line, cups and other materials are needed to support project based learning. Suggested projects include building a model architectural structure, room or facility, bridge, tower, aircraft and more.

9. Personal protection equipment such as safety goggles and gloves are required when students are at risk of injuring themselves while creating projects or utilizing tools and/or machinery.

10. Hand Tools various hand tools such as easy cutters, craft knives, hot glue guns and hot wire cutting machine will be utilized within the classroom. Safety precautions and training will be taken and provided at all times.

Standards

TECH.8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e., telephone for communication - smart phone for mobility needs).
TECH.8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
TECH.8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.
TECH.8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.