

## 7<sup>th</sup> Grade – Invention and Innovation

### Lesson 1 – Our First Invention

Duration – Six hours

**Big Idea** – Invention and innovation are creative ways to turn ideas into real things.

**Learning Objectives:** Students will:

1. Explain that new products and systems can be developed to solve problems or to help do things that could not be done without the help of technology.
2. Explain that the development of technology is a human activity and is the result of individual or collective needs and the ability to be creative.
3. Explain that technology is closely linked to creativity, which has resulted in innovation.
4. Demonstrate the ability to make trade-offs in the course of design.
5. Explain the corporations often create demand for a product by bringing it onto the market and advertising it.
6. Explain that specialization of function has been at the heart of many technological improvements
7. Define the terms invention and innovation.
8. Design and make a simple invention.
9. Explain that design involves a set of steps that can be performed in different sequences and repeated when needed.
10. Contribute to a group endeavor by offering useful ideas, supporting the efforts of others, and focusing on the task.
11. Work safely and accurately with a variety of tools, machines, and materials.

### Lesson 2 The Most Important Invention or Innovation of All Time

Duration – Four hours

**Big Idea** – The use of inventions and innovations has led to changes in society and the creation of new needs and wants

**Learning Objectives:** Students will:

1. Define and explain the role that technology and society play in the invention or innovation process.
2. Explain how societal expectations impact the acceptance and use of products and systems.
3. Identify, explain, and discuss the history of various inventions and innovations.
4. Organize and present research findings effectively.
5. Contribute to a group endeavor by offering useful ideas, supporting the efforts of others, and focusing on the task.
6. Identify famous inventors and their inventions.

### **Lesson 3 The Engineering Design Process**

Duration – Three to Five hours

**Big Idea** – Technology involves many types of problems and different approaches to solve them, including troubleshooting, research and development, invention and innovation, and experimentation.

**Learning Objectives:** Students will:

1. Explain that design is a creative planning process that leads to useful products and systems.
2. Explain why there is no perfect design.
3. Explain that requirements for a design are made up of criteria and constraints.
4. Explain that design involves a set of steps that can be performed in different sequences and repeated when needed.
5. Explain that brainstorming is a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
6. Explain that modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.
7. Explain how marketing a product involves informing the public about it well as assisting in selling and distributing it.
8. Explain how governmental regulations often influence the design and operation of transportation systems.
9. Apply the engineering design process to solve a problem.
10. Identify and describe the major steps in the engineering design process.

### **Lesson 4 Where Does the Trash Go?**

Duration – Four hours

**Big Idea** – Technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.

**Learning Objectives:** Students will:

1. Cite examples of the development and use of technology posing ethical problems.
2. Explain that knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
3. Describe how economic, political, and cultural issues are influenced by the development and use of technology.
4. Discuss the impacts of “waste materials” on the environment.
5. Describe how various “waste materials” can be recycled, reused, or re-manufactured into new products.
6. Describe, analyze and evaluate the impacts that inventions and innovations have had on the environment.
7. Use data collected to analyze and interpret trends in order to identify positive or negative effects of a technology.

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8. Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
9. Contribute to a group endeavor by offering useful ideas, supporting the efforts of others, and focusing on the task.

## Lesson 5A Rube Goldberg Challenge

Duration –6 hours

**Big Idea** – Innovation is the process of modifying an existing product, process, or system or system to improve it. Invention is a process of turning ideas and imagination into new products, processes, or systems.

**Learning Objectives** Students will learn to:

1. Apply a design process to solve problems in and beyond the laboratory-classroom.
2. Select criteria and constraints for the design.
3. Make two-dimensional and three-dimensional representations of a design solution.
4. Test and evaluate a design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
5. Make a product or system and document the process.
6. Safely use tools, products, and systems for specific tasks.
7. Use computers and calculators in order to achieve a given purpose.
8. Contribute to a group endeavor by offering useful ideas, supporting the efforts of others, and focusing on the task
9. Work safely and accurately with a variety of tools, machines, and materials.

## Lesson 5B Stuck On a Desert Island

Duration –6 hours

**Big Idea** – Innovation is the process of modifying an existing product, process, or system or system to improve it. Invention is a process of turning ideas and imagination into new products, processes, or systems.

**Learning Objectives** Students will learn to:

1. Explain that the development of technology is a human activity and is the result of individual or collective needs and the ability to be creative.
2. Explain that technology is closely linked to creativity, which has resulted in innovation.
3. Make a product or system and document the process.
4. Select criteria and constraints for a design.
5. Make two-dimensional and three-dimensional representations of a design solution.

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6. Test and evaluate a design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
7. Make a product or system and document the process.
8. Safely use tools, products, and systems for specific tasks.
9. Contribute to a group endeavor by offering useful ideas, supporting the efforts of others, and focusing on the task.

## **Lesson 6 Computer Aided Design**

Duration –4 hours

### **Course Timeline**

Lesson	Title	Hours
1	<b>Our First Invention</b>	6
2	<b>The Most Important Invention or Innovation of All Time</b>	4
3	<b>The Engineering Design Process</b>	5
4	<b>Where Does the Trash Go?</b>	4
5A	<b>Rube Goldberg Challenge</b>	6
5A	<b>Stuck On a Desert Island</b>	6
6	Computer Aided Design	4
	Total hours	35