



Northern York County School District

Curriculum Overview

Course: 4th Grade Discovery

Grade Level: 4

Development/Revision Date: January 2025

Length of Time: 30 Days

Course Description:

This course delves into the engineering design process, emphasizing the development and evaluation of solutions to contemporary problems with a focus on sustainability. Students will engage in research and hands-on testing to identify the most effective solutions. They will learn to pinpoint failure points and challenges in designs, turning these into opportunities for enhancement and innovation. A key component of the course is understanding the systematic and creative nature of the engineering design process. Through practical projects, collaborative work, and critical analysis, students will understand how to balance technological advancement with environmental awareness. This course is aligned to the Pennsylvania STEELS State Standards and the fifth grade STEELS PSSA (Pennsylvania System of School Assessment).

Course Objectives:

- Determine which tested solution best solves a problem
- Research and test possible solutions
- Identify failure points or challenges in designs, leading to opportunities for improvement
- Identify, evaluate, and compare multiple solutions to resolve problems
- Understand that engineering design is a systematic and creative process used to solve challenges
- Identify and compare renewable and nonrenewable resources used in technologies
- Explore sustainable practices and technologies that can reduce the environmental footprint of human activities

Related Standards:

Pennsylvania STEELS State Standards

- **3.5.3-5.G** Describe the helpful and harmful effects of technology.
- **3.5.3-5.H** Determine factors that influence changes in a society's technological systems or infrastructure.
- **3.5.3-5.O** Describe requirements of designing or making a product or system.
- **3.5.3-5.Q** Practice successful design skills.
- **3.5.3-5.AA** Create representations of the tools people made, how they cultivated to provide food, made clothing, and built shelters to protect themselves.
- **3.5.3-5.FF** Compare how things found in nature differ from things that are human-made, noting differences and similarities in how they are produced and used.
- **3.5.3-5.F** Classify resources used to create technologies as either renewable or nonrenewable.

- **3.5.3-5.E** Explain why responsible use of technology requires sustainable management of resources.
- **3.5.3-5.M** Demonstrate essential skills of the engineering design process.
- **3.5.3-5.I** Design solutions by safely using tools, materials, and skills.
- **3.5.3-5.R** Apply tools, techniques, and materials in a safe manner as part of the design process.
- **3.5.3-5.P** Evaluate the strengths and weaknesses of existing design solutions, including their own solutions.
- **3.5.3-5.C** Can follow directions to complete a technological task.
- **3.5.3-5.A** Can use appropriate symbols, numbers and words to communicate key ideas about technological products and systems.
- **3.5.3-5.U** Can evaluate designs based on criteria, constraints, and standards.
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Units:

- Computer Science Essentials
- Engineering Design Process
- Engineering Practices

Concepts:

- **IMPACTS OF TECHNOLOGY** - Human use of natural energy and resources impacts the environment, with renewable and nonrenewable options, while efforts are being made to protect Earth's ecosystems.
- **INFLUENCE OF SOCIETY ON TECHNOLOGICAL DEVELOPMENT** - Individual, family, and community values as well as environmental and economic factors may expand or limit the development of technologies. Products and systems are designed and marketed for a variety of purposes, including to generate profit. Sometimes these changes come at the expense of human and environmental health.
- **CORE CONCEPTS OF TECHNOLOGY AND ENGINEERING** - Designing effective solutions requires researching the problem, working within constraints, testing performance, and refining based on criteria and identified weaknesses.
- **DESIGN IN TECHNOLOGY AND ENGINEERING EDUCATION** - Effective problem-solving involves researching constraints, defining success criteria, testing various solutions, collaborating with peers, and refining designs based on performance evaluations and identified weaknesses.
- **HISTORY OF TECHNOLOGY** - Historical technological products and systems did

Competencies:

- Analyzes and explains ethical dilemmas in technology, including associated trade-offs.
- Illustrates connections between human-designed products and their impact or role in various contexts.
- Cultivates advanced written and oral communication skills for effective information exchange.
- Utilizes grade-appropriate tools, materials, and processes safely to construct projects.
- Locates and applies resources to effectively address technological questions.
- Embraces new technologies and devises strategies to refine and enhance existing ideas.
- Engages in hands-on experimentation to iteratively improve and optimize design solutions.

<p>not always work and often many attempts and variations were tested before an idea became a reality.</p> <ul style="list-style-type: none"> • NATURE AND CHARACTERISTICS OF TECHNOLOGY AND ENGINEERING - Engineering design is a systematic process that involves researching challenges, generating multiple solutions based on criteria and constraints, testing performance, and collaborating with peers to refine and improve designs. • APPLYING, MAINTAINING, AND ASSESSING TECHNOLOGICAL PRODUCTS AND SYSTEMS - Before designing a solution, it's essential to research the problem, test the solution's performance under various conditions, and communicate with peers to enhance the design process. 	
<p>Learning Activities:</p> <ul style="list-style-type: none"> • Ask questions and define problems • Plan and carry out investigations • Engage in argument from evidence • Develop and use models • Analyze and interpret data • Construct explanations and design solutions • Obtain, evaluate, and communicate information • Use math and computational thinking 	<p>Performance Tasks:</p> <ul style="list-style-type: none"> • Formative assessments such as student discussion, questioning, peer collaborative activities, reflections, and projects.
<p>Other Assessment Measures:</p> <ul style="list-style-type: none"> • SeeSaw portfolio 	
<p>Textbook/Primary Resource:</p> <p>Engineering is Elementary (2024). <i>Engineering is elementary (2nd ed.)</i>. Youth Engineering Solutions.</p>	
<p>Supplemental Resource Materials:</p>	