COURSE: Industrial Arts & Technology **LEVEL**: Grade 5 **UNIT/FOCUS**: The Nature of Technology: Creativity and Innovation

Desired Results

Related standard(s):

8.2.5.A.1
8.2.5.A.2
8.2.5.A.3
8.2.5.A.4
8.2.5.A.5

Transfer

Students will be able to independently use their learning to…

- Apply the design process
- Use and maintain technological products and systems
- Assess the impact of products and systems

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that… • Technology systems impact every aspect of the world in which we live.	*Students will keep considering…* • What are the characteristics and scope of technology? • What are the core concepts of technology? • What are the relationships among technologies and the connections between technology and other fields?

Grade Level Benchmarks

Knowledge	Skills
Students will know… • Things that are found in nature differ from things that are human-made in how they are produced and used. • Tools, materials, and skills are used to make things and carry out tasks. • Creative thinking and economic and cultural influences shape technological development. • A subsystem is a system that operates as a part of another system. • When parts of a system are missing, it may not work as planned. • Resources are the things needed to get a job done, such as tools and machines, materials, information, energy, people, capital, and time. • Tools are used to design, make, use, and assess technology. • Materials have many different properties. • Tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing. • Requirements are the limits to designing or making a product or system. • Technologies are often combined. • Various relationships exist between technology and other fields of study	*Students will be able to…* • Compare and contrast how products made in nature differ from products that are human made in how they are produced and used. • Investigate and present factors that influence the development and function of a product and a system. • Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints. • Compare and contrast how technologies have changed over time due to human needs and economic, political and/or cultural influences. • Identify how improvement in the understanding of materials science impacts technologies.

COURSE: Industrial Arts & Technology **LEVEL**: Grade 5 **UNIT/FOCUS**: Technology and Society

Desired Results

Related standard(s):

8.2.5.B.1
8.2.5.B.2
8.2.5.B.3
8.2.5.B.4
8.2.5.B.5
8.2.5.B.6

Transfer

Students will be able to independently use their learning to…

- Apply the design process
- Use and maintain technological products and systems
- Assess the impact of products and systems

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.	• What are the cultural, social, economic, and political effects of technology? • What are the effects of technology on the environment? • What is the role of society in the development and use of technology? • What is the influence of technology on history?

Grade Level Benchmarks

Knowledge	Skills
Students will know…	*Students will be able to…*
• When using technology, results can be good or bad. • The use of technology can have unintended consequences • Waste must be appropriately recycled or disposed of to prevent unnecessary harm to the environment. • The use of technology affects the environment in good and bad ways • Because people's needs and wants change, new technologies are developed, and old ones are improved to meet those changes. • Individual, family, community, and economic concerns may expand or limit the • development of technologies. • People have made tools to provide food, to make clothing, and to protect themselves.	• Examine ethical considerations in the development and production of a product through its life cycle. • Examine systems used for recycling and recommend simplification of the systems and share with product developers. • Investigate ways that various technologies are being developed and used to reduce improper use of resources. • Research technologies that have changed due to society's changing needs and wants. • Explain the purpose of intellectual property law. • Compare and discuss how technologies have influenced history in the past century. • Analyze the historical impact of waste and demonstrate how a product is upcycled, reused or remanufactured into a new product.

COURSE: Industrial Arts & Technology **LEVEL**: Grade 5 **UNIT/FOCUS**: Design

Desired Results

Related standard(s):

8.2.5.C.1
8.2.5.C.2
8.2.5.C.3
8.2.5.C.4
8.2.5.C.5
8.2.5.C.6
8.2.5.C.7

Transfer

Students will be able to independently use their learning to…

- Apply the design process
- Use and maintain technological products and systems
- Assess the impact of products and systems

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that… • The design process is a systematic approach to solving problems.	*Students will keep considering…* • What are the attributes of design? • What is engineering design? • What is the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving?

Grade Level Benchmarks

Knowledge	Skills
Students will know… • The design process is a purposeful method of planning practical solutions to problems. • Requirements for a design include such factors as the desired elements and features of a product or system or the limits that are placed on the design • The engineering design process involves defining a problem, generating ideas, selecting a solution, testing the solution(s), making the item, evaluating it, and presenting the results. • When designing an object, it is important to be creative and consider all ideas. • Models are used to communicate and test design ideas and processes. • Troubleshooting is a way of finding out why something does not work so that it can be fixed. • Invention and innovation are creative ways to turn ideas into real things. • The process of experimentation, which is common in science, can also be used to solve technological problems.	*Students will be able to…* • Collaborate with peers to illustrate components of a designed system. • Explain how specifications and limitations can be used to direct a product's development. • Research how design modifications have led to new products. • Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models. • Explain the functions of a system and subsystems. • Examine a malfunctioning tool and identify the process to troubleshoot and present options to repair the tool. • Work with peers to redesign an existing product for a different purpose.

COURSE: Industrial Arts & Technology **LEVEL**: Grade 5 **UNIT/FOCUS**: Abilities for a Technological World

Desired Results

Related standard(s):

8.2.5.D.1
8.2.5.D.2
8.2.5.D.3
8.2.5.D.4
8.2.5.D.5
8.2.5.D.6
8.2.5.D.7

Transfer

Students will be able to independently use their learning to…

- Apply the design process
- Use and maintain technological products and systems
- Assess the impact of products and systems

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that… • The designed world is the product of a design process that provides the means to convert resources into products and systems.	*Students will keep considering…* • How do I apply the design process? • How do I use and maintain technological products and systems? • How do I assess the impacts of products and systems?

Grade Level Benchmarks

Knowledge	Skills
Students will know… • The process of designing involves presenting some possible solutions in visual form and then selecting the best solution(s) from many. • Solutions for the design problem need to be tested and evaluated. • Design solutions can be improved. • Tools, products, and systems are better suited for specific tasks. • Computers can be used to access and organize information. • There are a variety of ways to communicate key ideas • Products and systems can have trade offs.	*Students will be able to…* • Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered. • Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions. • Follow step by step directions to assemble a product or solve a problem. • Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved. • Describe how resources such as material, energy, information, time, tools, people and capital are used in products or systems. • Explain the positive and negative effect of products and systems on humans, other species and the environment, and when the product or system should be used. • Explain the impact that resources such as energy and materials used in a process to produce products or system have on the environment.