TECHNOLOGY STANDARDS
Grade 4

Standard 1 Nature of Technology

Students develop an understanding of technology, its characteristics, scope, core concepts* and relationships between technologies and other fields.Students learn that technology extends human potential by allowing people to do things more efficiently than they would otherwise be able
to do. Students learn that useful technological development is a product of human knowledge, creativity, invention, innovation, motivation and demand for new products and systems. They learn that the natural and human-made designed worlds are different, and that tools and materials are used to alter the environment. Students learn that the development of emerging technology is exponential, driven by history, design, commercialization, and shaped by creative/inventive thinking, economic factors and cultural influences.*The core concepts of technology include
systems, resources, requirements, optimization and trade-offs, processes and controls.

Benchmark A: Compare and discuss the characteristics of technology in our *community*.
Grade Four
Natural or Human-made
1. Describe how the processing of things found in nature result in human-made artifacts (e.g., furniture may be made from lumber, which comes from trees).
Tools, Materials, Skills
 2. Demonstrate how tools, materials and skills are used to perform tasks (e.g., computers and cell phones are used to communicate; pencil sharpeners).
Creating Technology
3. Describe ways creative thinking, economic and cultural influences shape technological development (e.g., Wright Brothers, powered flight, air commerce).
4. Recognize that creative thinking, economics and culture influence technological development (e.g., a city may need to design a mass transit system for transportation while a small town may use personal vehicles).

Benchmark B: Identify, describe and discuss the core concepts of technology.
Grade Four
Resources
1. Classify materials by property.
Processes
2. Select and use tools to design, make and modify technology.
3. Cite examples of how tools and machines extend human capabilities (e.g., automobiles are more efficient than walking great distances).

Benchmark C: Compare and discuss the relationships among technologies, and the connections between technology and other fields of study.
Grade Four
Connections
1. Describe what is needed to cause a technology to develop further in each of the technological
systems (e.g., business support and research initiatives).

Standard 2 Technology and Society Interaction

Students recognize interactions among society, the environment and technology, and understand technology's relationship with history. Consideration of these concepts forms a foundation for engaging in responsible and ethical use of technology.Students learn that the interaction between society and technology has an impact on their lives, that technology may have unintended consequences which may be helpful or harmful. They learn that interaction of technology will affect the economy, ethical standards, environment and culture. Students evaluate the impact of products or systems by gathering and synthesizing information, analyzing trends and drawing conclusions. Students analyze technological issues and the implications of using technology. They acquire technological understanding, and develop attitudes and practices that support ethical decision-making and lifelong learning.

Benchmark A: Define responsible citizenship relative to technology.
Grade Four
Technology and Citizenship

1. Explore and compare common uses of technology in daily life, and the advantages and disadvantages those uses provide.
2. Discuss basic issues related to responsible use of technology and information, and describe personal consequences of inappropriate use.
3. Describe why it is important for everyone to have access to information sources and information technology.
Benchmark B: Investigate and explain the interrelationships between technology and the environment.
Grade Four
Technology and the Environment
1. Describe how appropriate management of resources and waste can prevent harm to the environment.
Benchmark C: Explain and demonstrate the influence of technology throughout history.
Grade Four
Technology and History
1. Describe the advantages that resulted from people making and using tools (e.g., importance of the grist mill, saw mill, carding mill to early Ohio settlements).
Inventors/Inventions
2. Explain the role of Ohio's inventors in the social and economic development of society (e.g., Thomas Edison, the Wright Brothers, Charles F. Bush, Granville T. Woods, Elisha Gray, James W. Packard, Alexander Winton, Frank A. Sieberling, Garrett Morgan, Charles Kettering).
Benchmark D: Practice responsible use of technology, understand school district guidelines for technology use, and explore technology ownership.
Grade Four
Intellectual Property
1. Practice respect for intellectual property rights (e.g., another student's ideas and acknowledge all contributions to group work).
2. Discuss technology ownership rights, including the concept that the creator of the technology may be the owner, and that users must purchase the right to use the technology (e.g., a company may own rights to products made by its employees).
Acceptable Use
3. Discuss policies presented in the district Acceptable Usage Policy (AUP) and understand that the AUP describes the rules for using school-based technology.
Benchmark E: Identify development patterns and examine the influence of technology on the world.
Grade Four
Technology and Assessment
1. Classify collected information in order to identify technology development patterns.
2. Investigate and assess the influence of a specific technology on families and the community.
3. Develop rules for evaluating the trade-offs when selecting or using a product or system.

Standard 3 Technology for Productivity Applications
Students learn the operations of technology through the usage of technology and productivity tools. Students use computer and multimedia resources to support their learning. Students understand terminology, communicate technically and select the appropriate technology tool based on their needs. They use technology tools to collaborate, plan and produce a sample product to enhance their learning, and solve problems by investigating, troubleshooting and experimenting using technical resources.
Benchmark A: Understand computer and multimedia technology concepts and communicate using the correct terminology.
Grade Four
Basic Concepts
1. Learn and use new technology terminology based on the computer and multimedia technology resources being used.
2. Define technological terms as discovered.
Benchmark B: Use appropriate tools and technology resources to complete tasks and solve problems.
Grade Four
Basic Concepts

1. Explain how input and output devices operate and interact with computers and multimedia technology resources.
Basic Operations
2. Demonstrate ability to login and use basic network services.
3. Discuss different software programs and what they do.
4. Discuss image formats (JPEG, GIF, TIFF).
5. Save, transport and access stored information from portable devices (e.g., portable hard drives, universal serial bus—USB devices, memory sticks).
Problem-solving
6. Demonstrate how technology productivity tools can be used to help understand data.
Productivity Tools
7. Collect/create digital images and sounds related to a particular topic.
Keyboarding
8. Demonstrate appropriate keyboarding skills.
Benchmark C: Use productivity tools to produce creative works and prepare publications.
Grade Four
Productivity Tools
1. Use productivity tools and peripherals to increase skills and facilitate learning throughout the curriculum.
Communication Tools
2. Use technology resources for collaborating and brainstorming ideas (e.g., using concept-mapping programs in groups).
1. Use media and technology resources for presenting information (e.g., projectors, video cameras).

Standard 4 Technology and Communication Applications
Students use an array of technologies and apply design concepts to communicate with multiple audiences, acquire and disseminate information and enhance learning. Students acquire and publish information in a variety of media formats. They incorporate communication design principles in their work. They use technology to disseminate information to multiple audiences. Students use telecommunication tools to interact with others. They collaborate in real time with individuals and groups who are located in different schools, communities, states and countries. Students participate in distance education opportunities which expand academic offerings and enhance learning.
Benchmark A: Identify the concepts and operations of communication systems.
Grade Four
Design Elements
1. Collect and evaluate examples of good design (contrast, size, arrangement) in print and electronic media.
Use of Communications
2. Investigate online learning environments (e.g., online courses, distance learning, video-conferencing and productions).
3. Contribute to real time classroom technology communication sessions.
Benchmark B: Develop, publish and present information in print and digital formats.
Grade Four
Multimedia Applications
1. Organize presentations by using storyboarding techniques.
2. Construct information by using a variety of software applications.
3. Edit digital images (e.g., crop, enhance brightness and/or contrast, adjust color, resize).
4. Generate a document that includes graphics from more than one source (e.g., find images that match assignment needs and insert them into a document).
5. Develop a slide show using graphics, text and audio from more than one source (e.g., create a presentation about Ohio government with text, pictures and music or narration).
6. Present information in a class video project.
Use of Communications
7. Identify the proper structure and components of e-mail:
a. Address structure;
b. Signature line;

c. Body of message; and
d. Subject line.
8. Use e-mail to share information.
Benchmark C: Use technology communications to participate in online group collaborative interactive projects and activities.
Grade Four
Use of Communications
1. Compose, send, receive and reply to e-mail.
2. Present and receive information in teacher/student directed online learning or video-conferencing activities (e.g., government agencies, historical society or museum).

Standard 5 Technology and Information Literacy
Students engage in information literacy strategies, use the Internet, technology tools and resources, and apply information-management skills to answer questions and expand knowledge. Students become information-literate learners by utilizing a research process model. They recognize the need for information and define the problem, need or task. Students understand the structure of information systems and apply these concepts in acquiring and managing information. Using technology tools, a variety of resources are identified, accessed and evaluated. Relevant information is selected, analyzed and synthesized to generate a finished product. Students evaluate their information process and product.
Benchmark A: Describe types of information: facts, opinions, primary/secondary sources; and formats of information: number, text, sound, visual, multimedia; and use information for a purpose.
Grade Four Understanding
Information
1. Collect information (organized data and facts) and data (raw facts and figures) and identify answers to questions (e.g., locate data in a newspaper article, identify information on a sign).
2. Discuss and define the difference between fact and opinion (e.g., the cafeteria served pizza today— fact, the pizza was good—opinion).
3. Identify ways information can be presented (e.g., text, visual information on a map, information displayed in pictures or as graphics).
Primary/Secondary Sources
4. Use primary source material to describe a person, place, thing or event (e.g., oral history, diary entries, photos, etc.).
Benchmark B: Use technology to find information by applying a research process to decide what information is needed, to find sources, to use information and to check work.
Grade Four
Decide
1. Determine questions to be answered by research.
2. Identify search terms for identified questions: author, title, subject, keyword.
Find
3. Select needed information from a defined group of resources: library catalog, online encyclopedia and subject list of age appropriate Web sites.
Use
4. Record and organize information gathered from selected resources to generate a product.
5. Construct a list of the sources used in creating the project: author, title of source and date.
Check
6. Evaluate the product to determine if the research questions were answered.
Benchmark C: Use the Internet to find, use and evaluate information.
Grade Four
Beginning Searching
1. Choose a search engine or directory specifically designed for students to locate information on the Internet.
2. Type a simple search term in the search engine or directory to find facts and answer questions.
3. Read the list of results from the search engine or directory to locate potentialWeb sites relevant to the search topic.
Web Site Evaluation

4. Choose a Web site and examine the information for facts by identifying information on the Web site:
a. Author;
b. Title;
c. Date produced;
d. Special features (images, puzzles, activities); and
e. Available products, services or resources.
Benchmark D: Identify, access and use electronic resources from both free and fee-based Internet sources.
Grade Four
Electronic Resources
1. Demonstrate use of online fee-based (subscription or pay per use) electronic resources (e.g., state and/or district provided resources such as magazine databases, encyclopedias, dictionaries).
2. Use a subscription resource or database (fee-based or pay-for-use) to locate information for a curricular need (e.g., select the subscription resource based on the curricular need).

Standard 6 Design
Students will apply a number of problem-solving strategies demonstrating the nature of design, the role of engineering and the role of assessment. Students recognize the attributes of design; that it is purposeful, based on requirements, systematic, iterative, creative, and provides solution and alternatives. Students explain critical design factors and/or processes in the development, application and utilization of technology as a key process in problem-solving. Students describe inventors and their inventions, multiple inventions that solve the same problem, and how design has affected their community. They apply and explain the contribution of thinking and procedural steps to create an appropriate design and the process skills required to build a product or system. They critically evaluate a design to address a problem of personal, societal and environmental interests. Students systematically solve a variety of types of problems using different design approaches including troubleshooting, research and development, innovation, invention and experimentation.
Benchmark A: Describe and apply a design process to solve a problem.
Grade Four
Design Process
1. Apply the design process to purposefully solve a problem (e.g., how to improve recycling at school and home).
2. Generate solutions for solving a problem using the design process using information collected about everyday technological problems.
Research and Development
3. Survey potential users to evaluate a solution to a technical problem (e.g., survey other students about which type of model plane they like).
Technical Communication
4. Make sketches and paper models to visualize possible solutions to a technological problem (e.g., use computer draw programs to prepare cut-out patterns).
Redesign
5. Recognize where changes to a solution are needed to meet the requirements.
Inventors/Inventions
6. Identify Ohio inventors and designers who contributed to the development of each of the technological systems:
a. Energy and power;
b. Transportation;
c. Manufacturing;
d. Construction;
e. Information and communication;
f. Medical; and
g. Agricultural and related biotechnologies.
Benchmark B: Describe how engineers and designers define a problem, creatively solve it and evaluate the solution.

Grade Four
Innovation and Invention
1. Describe how models are used to communicate and test design ideas and processes (e.g., model truss designs are tested for weight loads using bridge building simulation software).
Strength and Materials
2. Describe the structural needs to be met when designing an object (e.g., in designing a bridge, the maximum weight to be supported must be decided).
Technical Careers
3. Identify different types of engineers (e.g., manufacturing, architects, automotive, ceramic, materials, environmental, civil, electrical, agricultural, safety, biological, audio, mechanical, chemical).
Benchmark C: Understand the role of troubleshooting in problem-solving.
Grade Four
Technical Problem-solving
1. Apply the process of experimentation to solve a technological problem (e.g., test which glue works best for a given material).
2. Describe how scientific principles can be used in solving technological problems (e.g., will a stain look the same on different types of wood?).
Technical Careers
1. Identify different types of engineers and the types of problems they troubleshoot (e.g., manufacturing—part the wrong size, architects—weak structural support, automotive—exhaust pollution).

<u>Standard 7 Designed World</u>
Students understand how the physical, informational and bio-related technological systems* of the designed world are brought about by the design process. Critical to this will be students' understanding of their role in the designed world: its processes, products, standards, services, history, future, impact, issues and career connections. Students learn that the designed world consists of technological systems* reflecting the modifications that humans have made to the natural world to satisfy their own needs and wants. Students understand how through the design process the resources: materials, tools and machines, information, energy, capital, time and people are used in the development of useful products and systems. Students develop a foundation of knowledge and skills through participation in technically oriented activities for the application of technological systems. Students demonstrate understanding, skills and proficient use of technological tools, machines, instruments, materials and processes across technological systems in unique and/or new contexts. Students identify and assess the historical, cultural, environmental, governmental and economic impacts of technological systems in the designed world. *The technological systems areas include energy and power technologies, transportation technologies, manufacturing technologies, construction technologies, information and communication technologies, medical technologies, agricultural and related biotechnologies.
Benchmark A: Develop an understanding of how physical technologies enhance our lives.
Grade Four
Energy and Power
1. Describe how energy is converted to produce light, heat and motion in machines and products.
2. Describe how different devices consume different amounts of energy.
Transportation
3. Understand that transportation systems may lose efficiency or fail if one part is missing or malfunctioning, or if a subsystem is not working.
4. Discuss how modes of transportation have changed over the years in Ohio.
Manufacturing
5. Explore, physically or virtually, manufacturing facilities and describe how products are designed, resources gathered, and tools used to separate, form and combine materials in order to produce products.
6. Identify types of manufacturing done in Ohio (e.g., pottery, steel, glass, automobiles and chemicals).
Construction

7. Describe ways in which structures need to be maintained (e.g., floors waxed, walls painted, roofs replaced, drains cleaned).

Benchmark B: Recognize appropriate modes of technical communication across technological systems.

Grade Four

Information and Communication

1. Describe how information can be acquired and sent through a variety of technological sources, including print and electronic media.

2. Use letters, characters, icons, symbols and signs to represent ideas, quantities, elements and operations.

Benchmark C: Develop an understanding of how bio-related technologies improve our lives.

Grade Four

Medical

1. Describe technological advances that have made it possible to create new devices, repair or replace certain parts of the body, and provide a means for mobility.

Agriculture and Related Biotechnologies

2. Identify agricultural waste and ways that it can be recycled or safely processed.

3. Describe how and explain why food is processed.

4. List foods grown or produced in Ohio.

5. Identify machinery used in the production of Ohio agricultural products.