

Ohio Technology Academic Content Standards Grades 6 - 8

Standards, Benchmarks and Indicators by Grade	Comments
Standard 1 Nature of Technology Students develop an understanding of technology, its scope, core concepts*, characteristics and relationships between technologies and other fields.	
Benchmark A: Analyze information relative to the characteristics of technology and apply in a practical setting.	
Grade Six	
1. Recognize that there are multiple factors associated with developing products and systems.	
2. Suggest alternative technological solutions for everyday problems that occur in the school or classroom.	
3. Follow procedures for identifying and solving system and equipment problems that may occur.	
4. Cite examples of how characteristics of technology are evident in daily life: a Technology is human knowledge; b Technology involves tools, materials and systems; c Application of technology results in artifacts (things or items); and d Technology is developed by people to control natural and human-made environments.	
Grade Seven	
1. Describe the factors involved in developing products and systems using technology (e.g., market survey, design, development, prototyping, assessing, producing, quality assurance, marketing).	
2. Develop technological solutions to problems.	
3. Discuss ways that technology is linked to creativity and innovation.	
Grade Eight	
1. Design technological solutions to problems generated by individual or collective needs.	
2. Interpret the interrelationship between technology, creativity and innovation.	
3. Formulate how a demand for a product may be created through marketing and advertising (e.g., marketing personal computers, music and game devices).	
4. Apply multiple factors when developing products and systems to solve problems.	

Standards, Benchmarks and Indicators by Grade	Comments
Benchmark B: Apply the core concepts of technology in a practical setting.	
Grade Six	
1. Describe the relationship among input, process, output and feedback as components of a system.	
2. Define requirements as the parameters placed on the development of a product or system.	
3. Recognize that controls are mechanisms or particular steps that people perform when using information about the system that causes systems to change.	
Grade Seven	
1. Differentiate between open-loop and closed-loop systems: recognize that an open-loop system has no feedback path and requires human intervention, while a closed-loop system uses feedback.	
2. Describe ways that technological systems can be connected to one another.	
3. Identify parameters that may be placed on the development of a product or system (e.g., cost, time, size).	
4. Cite examples of controls, and predict resultant changes in a system for that control (e.g., the heating system thermostat regulates the air temperature of the room).	
5. Infer that malfunctions of any part of a system may affect the function and quality of the system.	
6. Recognize that maintenance is the process of inspecting and servicing of a product or system on a regular basis.	
Grade Eight	
1. Demonstrate how technological systems can be connected to one another.	
2. Examine parameters and constraints in the design of a product or system.	
3. Utilize controls to make changes in a system resulting in a desired outcome.	
4. Indicate ways a system malfunction may affect the function and quality of the system.	
5. Recognize that trade-offs are the result of the decision-making process, involving careful compromises among competing factors.	
Benchmark C: Analyze the relationships among technologies and explore the connections between technology and other fields of study.	
Grade Six	
1. Identify technological systems that interrelate (e.g., computer peripherals, the engine and transmission of an automobile).	
2. Understand that products, systems and environments that have been developed for one setting may be applied to another setting.	
3. Recognize that knowledge from other fields of study impacts the development of technological systems and products.	

Standards, Benchmarks and Indicators by Grade	Comments
Grade Seven	
1. Describe the situational interdependence of technologies (e.g., space shuttle crew depends on communication technologies in order to maneuver the craft).	
2. Identify products that have been applied to alternative settings.	
3. Explain how knowledge from other fields of study may impact the development of technological systems and products.	
Grade Eight	
1. Demonstrate ways that technological systems interrelate.	
2. Suggest products that could be used in an alternative setting.	
3. Explain ways that invention and innovation within one field can transfer into other areas of technology.	
4. Cite examples of how transferred knowledge has impacted the development of technological systems and products (e.g., 1805 Jacquard weaving loom punch card system influenced development of 1950's computer punch card systems).	
5. Describe and cite examples illustrating how different technologies require different processes.	

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.	
Benchmark A:	
Analyze technologically responsible citizenship.	
Grade Six	
1. Discuss how new technologies have resulted from the demands, values and interests of individuals, businesses, industries and societies.	
2. Describe how the use of technology affects humans in various ways including their safety, comfort, choices and attitudes about technology's development and use.	
Grade Seven	
1. Classify how new technologies have resulted from the demands, values and interests of individuals, businesses, industries and societies.	
2. Relate ways that the uses of inventions and innovations have led to changes in society and the creation of new needs and wants.	
3. Identify how societal expectations drive the acceptance and use of products and systems (e.g., impact of the automobile in Ohio 1891 to the present).	

Grade Eight	
1. Explain how economic, political and cultural issues are influenced by the development and use of technology.	
2. Describe how societal expectations drive the acceptance and use of products and systems.	
3. Describe how the use of technology affects humans in various ways, including their safety, comfort, choices and attitudes about technology's development and use.	
Benchmark B: Describe and explain the impact of technology on the environment.	
Grade Six	
1. Describe and give examples of why and how the management of waste produced by technological systems is an important societal issue.	
2. Explain how technologies can be used to repair damage caused by natural disasters.	
3. Identify an existing, or an area needing a riparian buffer, between a developed area and a natural stream or waterway.	
Grade Seven	
1. Explain how the development and use of technologies often put environmental and economic concerns in direct competition with one another.	
2. Explain the life cycle of a typical product or structure.	
3. Describe the proper disposal and/or recycling of used products (e.g., electronic equipment, lawnmower oil, batteries).	
Grade Eight	
1. Explain how the life cycle of a product or structure may impact the environment.	
2. Identify items/products that would benefit the environment if they were designed to be biodegradable.	
3. Investigate emerging environmental restoration technologies (e.g., electrokinetic remediation to remove chemical contaminants from soil).	
Benchmark C: Describe how design and invention have influenced technology throughout history.	
Grade Six	
1. Describe how some inventions have evolved by using a deliberate and methodical process of tests and refinements.	
2. Describe how in the past an invention or innovation was not always developed with the knowledge of science.	
Grade Seven	
1. Explain how the design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.	
2. Analyze a design or invention and explain its historical importance (e.g., 1735 invention of a timepiece that English ships used to accurately navigate longitude position around the world).	
Grade Eight	
1. Describe how the specialization of function has been at the heart of many technological improvements (e.g., welding: many different processes have been developed to join materials).	
2. Examine and compare eras of design in architecture, aviation, transportation, medical instruments and astronomy.	

Benchmark D: Articulate intellectual property issues related to technology and demonstrate appropriate, ethical, and legal use of technology.	
Grade Six	
1. Understand the concept of intellectual property (e.g., author's ownership of work).	
2. Compare key concepts of intellectual property including ownership of technology, copyright, patent, trademark, trade name, and discuss consequences of violating others intellectual property rights.	
3. Distinguish original work from work that is plagiarized.	
4. Follow policies presented in the district Acceptable Usage Policy (AUP) and discuss consequences of inappropriate use of technology.	
Grade Seven	
1. Analyze a situation to determine the steps necessary to respect intellectual property rights including patents, copyrights, trade names and trademarks.	
2. Discuss plagiarism and its ramifications.	
3. Understand that installation of software requires an appropriate software license, and that the license determines how many times the software may be installed (e.g., does the license allow the software to be installed on more than one computer?).	
4. Understand that Web page content may not be copied and imported into a new owner's Web page.	
5. Understand that photos, images, graphics, sounds or videos displayed on the Internet are generally copyright protected and may not be copied, pasted, saved, imported, or used in new content without permission of the copyright owner.	
6. Explore appropriate use of logos, icons, graphics, etc. in relation to trademark and trade name rights (e.g., understand that trademark logos may not be incorporated into new works without consent of the owner or payment of fees and/or royalties).	
7. Analyze situations that arise regarding the use of intellectual property, including ethical considerations.	
8. Determine steps necessary to respect intellectual property rights (e.g., obtain permission from the owner, credit the source of the items, pay a license fee to use the item).	
Grade Eight	
1. Demonstrate legal and ethical practices when completing projects/schoolwork.	
2. Adhere to copyright restrictions.	
3. Define fair use in regard to technology-generated educational materials.	
4. Discuss software piracy, its impact on the technology industry, and possible repercussions to individuals and/or the school district.	
5. Determine copyright, trademark, trade name restrictions to consider when using the Internet or other technology resources (e.g., do not violate intellectual property restrictions when using materials).	

Benchmark E: Assess the impact of technological products and systems.	
Grade Six	
1. Employ the use of measuring instruments to collect data.	
2. Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.	
Grade Seven	
1. Employ the use of instruments with different measuring standards to collect data (e.g., temperature, acidity—pH; level, voltage, heart rate, speed).	
2. Identify trends and monitor potential consequences of technological development.	
3. Analyze an environmental health concern and identify the elements of that problem, (e.g., sources of environmental stressors, types of environmental stressors, environmental media, distribution of environmental stressors, and human receptors).	
Grade Eight	
1. Design and use appropriate instruments to gather data (e.g., design, fabricate and use a balance scale).	
2. Interpret and evaluate the accuracy of the information obtained during a test or experiment and determine if it is useful.	
3. Analyze responses to an environmental health concern and identify the types of solutions to that problem (e.g., psychological/social responses; political, legal and economic processes; environmental controls; waste/management).	

Standard 3 Technology for Productivity Applications Students learn the operations of technology through the usage of technology and productivity tools.	
Benchmark A: Demonstrate an understanding of concepts underlying hardware, software and connectivity.	
Grade Six	
1. Use vocabulary related to computer and multimedia technology systems (e.g., network, local area network—LAN, wide area network—WAN, wireless, connectivity).	
2. Describe how computers connect to the Internet (e.g., what is the information super highway/World Wide Web and how can you connect to it?).	
Grade Seven	
1. Use vocabulary related to computer and multimedia technology systems (e.g., universal serial bus—USB, hubs and switches).	
2. Explain how computer components interact.	
3. Explain the purpose and different functions of software programs.	
Grade Eight	
1. Describe how computer and multimedia technology systems work (e.g., asynchronous transfer mode—ATM, Internet protocol—IP, local area networks—LAN, wide area networks—WAN, wireless).	

Benchmark B: Select appropriate technology resources to solve problems and support learning.	
Grade Six	
1. Explain the purpose of software programs.	
2. Present independent research findings in a multimedia format.	
3. Investigate technology tools used to organize and represent data collected in problem situations.	
4. Demonstrate proper keyboarding techniques, assess keyboarding accuracy and develop speed.	
Grade Seven	
1. Solve problems using all available technologies for inquiry, investigation, analysis and presenting conclusions.	
2. Investigate various formats of video content and methods of presentation (e.g., .wmv, mpeg, .avi, flash).	
3. Edit video clips using video editing software.	
4. Develop speed and accuracy when keyboarding, and transition to a word processing environment.	
Grade Eight	
1. Incorporate all available technology tools and resources to research, investigate, solve and present findings in a problem situation.	
2. Create a video production related to a class activity.	
3. Research educational video clips available online for use in class projects (e.g., consider copyright and fair use issues when selecting video clips).	
4. Demonstrate effective keyboarding skills in a word processing environment.	
Benchmark C: Use productivity tools to produce creative works, to prepare publications and to construct technology-enhanced models.	
Grade Six	
1. Use content-specific tools, software and simulations to support learning and research (e.g., thermometers, applets, interactive geometric programs, model robots).	
2. Apply technology resources to create an educational project (e.g., use a spreadsheet to organize the data that represents the results from an experiment).	
Grade Seven	
1. Use content-specific tools, software and simulations to support learning and research to create educational projects (e.g., aerodynamic model design, bridge building simulation, design tools, how it works Web-sites).	
2. Apply technology resources to support group collaboration and learning throughout the curriculum.	
Grade Eight	
1. Use content-specific tools, software and simulations to support learning, and research societal and educational problems (e.g., economic simulations, city planning simulation, flight simulators, rapid prototyping).	
2. Apply technology resources to support personal productivity, and learning throughout the curriculum.	

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.	
Benchmark A: Communicate information technologically and incorporate principles of design into the creation of messages and communication products.	
Grade Six 1. Explain that information is communicated for specific purposes.	
2. Define principles of design used to create print, multimedia and Web communications or products (e.g., color, contrast, repetition, alignment, proximity).	
3. Produce information products that incorporate principles of design.	
Grade Seven 1. Classify reasons to communicate information and explain why technology enhances communication (e.g., to explain, inform, persuade, sell, archive information in ways that reach a variety of audiences).	
2. Integrate advanced design features into communication products (e.g., background selection, framing, set design).	
3. Generate multimedia presentations that communicate information for specific purposes.	
Grade Eight 1. Determine audience characteristics that impact the content of the message (e.g., level of understanding, level of interest).	
2. Differentiate audience factors that influence the selection of the communication tool (e.g., will the message be communicated to an individual or a small or large group? will the message be communicated more than once?).	
3. Examine the connections among message content, context and purpose (e.g., is the content of the message impacted by the context in which the message is given—does the context impact the purpose?).	
4. Reconstruct messages with different communication tools and determine if the tool changes the meaning of the message.	
5. Identify and practice the following Universal Design principles that ensure accessibility for all users of communication projects or products: a Image size; b Alt attributes/tags; c Use of tables and frames; d Use of style sheets; e Formatting; f Use of color text legibility and readability; and g Fonts, formatting and captioning.	

Benchmark B: Develop, publish and present information in a format that is appropriate for content and audience.	
Grade Six 1. Create and publish information in printed form (e.g., use software to produce homework assignments, reports, flyers, newsletters).	
2. Develop and publish information in electronic form (e.g., slide presentations, multimedia products, Web materials).	
Grade Seven 1. Select an appropriate software tool to create and publish print information (e.g., word processor for a report, desktop publishing tool for signs/calendars/newsletters).	
2. Distinguish electronic file types and determine extensions including .txt, .rtf, .doc, .pdf and others.	
3. Insert original sound files into multimedia presentation (e.g., AVI, WAV, MPEG).	
4. Insert copyright-free images (photos/graphics) into multimedia presentations (e.g., GIF, JPEG).	
5. Transform digital images by using editing software to: - a Crop; - b Rotate, flip, invert; - c Add text, borders, decorative elements; - d Adjust color (apply spot coloring, image touch-up); and - e Layer or merge images.	
Grade Eight 1. Construct and publish information in printed and electronic form (e.g., printed reports, resumes, brochures, charts and electronic presentations, videos, Web sites).	
2. Select appropriate file types (documents, sounds, images, and multimedia) based on communication need.	
3. Evaluate information product based on content and audience (e.g., did the information communicate the intended message to the correct audience?).	
Benchmark C: Select appropriate technology communication tools and design collaborative interactive projects and activities to communicate with others.	
Grade Six 1. Use e-mail functions including: - a Sending; - b Receiving; - c Replying; - d Adding a hyperlinked address in message; - e Organizing mail folders; and - f Adding attachments to message.	

2. Participate in discussion lists, message boards, chat and other means of appropriate electronic communication (e.g., ask-an-expert, pen pals).	
3. Investigate assigned topics using online learning resources (e.g., weblogs, Web cast, video-conferencing and other distance learning opportunities).	
Grade Seven	
1. Compose e-mail messages and incorporate advanced techniques (e.g., include attachments, send to multiple recipients, format stationary, manage inbox, create address book).	
2. Acquire and disseminate information by participating in virtual learning activities (e.g., Web casts, video-conferencing, distance-learning offerings).	
Grade Eight	
1. Design collaborative interactive activities or projects (e.g., online election for school office, survey, data collection).	
2. Disseminate results obtained through collaborative research projects to a larger audience (e.g., post results on a Web page, e-mail to group participants).	
3. Select an appropriate communications tool to obtain and share information (e.g., e-mail, chat, message board, video-conferencing, online project).	
4. Critique e-mail to determine communication clarity, and consider appropriate operations and etiquette (e.g., reply, reply all, include original message in reply, etc.).	

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.	
Benchmark A:	
Evaluate the accuracy, authority, objectivity, currency, coverage and relevance of information and data sources.	
Grade Six	
1. Select relevant information by identifying main ideas and supporting facts that help answer questions.	
2. Determine that information located can be used legally and choose appropriately (e.g., locate copyright information for print and graphic information, check for copyright restrictions).	
3. Check copyright and publication dates to determine currency of information.	
4. Investigate the authority of an online information source to determine the author's qualification to be an expert about a topic (e.g., famous scientist versus a sixth-grader's Web site; well-known organization versus a personal Web site).	

Grade Seven	
1. Distinguish when current copyright dates of sources are important in answering an information need (e.g., science information on cloning, results of an election).	
2. Assess the objectivity (ability of an author to present information without bias) of a source when using information.	
3. Compare multiple sources (online encyclopedia, Web site, online magazine database, print source) to check accuracy of information (e.g., do facts match on each site?).	
4. Determine the scope of coverage for a given source (does the source cover all of the needed information?).	
5. Chart information gathered from multiple sources to determine facts to be used in a project.	
Grade Eight	
1. Understand the structure and organization of information sources including key words, subject directory, subject search in a library catalog or search engine.	
2. Demonstrate how to determine copyright issues when creating new products: • Ask permission to use articles, quotations and graphics; and • Credit information to be included in the product.	
3. Examine two Web sites with opposing viewpoints and describe the objectivity and intent of the author (e.g., candidates in an election, or other public issues).	
4. Evaluate the validity of information by comparing information from different sources for accuracy (e.g., what makes the author an expert—is information the same in multiple sources?).	
Benchmark B: Use technology to conduct research and follow a research process model which includes the following: develop essential question; identify resources; select, use and analyze information; synthesize and generate a product; and evaluate both process and product	
Grade Six	
1. Generate questions to be answered or a position to be supported when given a topic.	
2. Recognize that finding and using more than one source can produce a better product.	
3. Use a variety of technology resources for curriculum needs and personal information needs: library catalog, online encyclopedia, Web sites.	
4. Examine information in different types of subscription resources—fee-based, pay-to-use to locate information for a curricular need (e.g., magazine database, picture archive, online encyclopedia).	
5. Identify relevant facts, check facts for accuracy, record appropriate information and create an information product to share with others.	
6. List information sources used in a district-adopted or teacher-prescribed format (e.g., MLA, APA).	
7. Review how the information found for the project was used and discuss the quality of the product.	

Grade Seven	
1. Develop open-ended research questions about a defined information need.	
2. Select and evaluate relevant information about a specific topic in several sources.	
3. Select information from different types of subscription resources (fee-based, pay-to-use) to meet an information need (e.g., magazine database, picture archive, online encyclopedia).	
4. Compile information learned about a topic from a variety of sources.	
5. Create information products to share information using different formats (e.g., print, audio recording, digital, video, slide show).	
6. Evaluate how information was found and assess the quality of the information product.	
Grade Eight	
1. Formulate an essential question to guide the research process.	
2. Identify and evaluate relevant information and select pertinent information found in each source.	
3. Analyze information, finding connections that lead to a final information product.	
4. Demonstrate how to determine copyright issues when creating new products (e.g., permission to use articles and graphics, credit information to be included).	
5. Use a teacher or district designated citation or style manual to credit sources used in work (e.g., MLA style manual, APA Guidelines, or other selected style manuals).	
6. Digitize information for archiving and future use (e.g., creating an electronic portfolio of curricular projects).	
7. Revise and edit information product.	
8. Evaluate final product for its adherence to project requirements (e.g., recognize weaknesses in process and product and find ways to improve).	
Benchmark C: Develop search strategies, retrieve information in a variety of formats and evaluate the quality and appropriate use of Internet resources.	
Grade Six	
1. Explain the function of a Web browser (e.g., what is the difference between the browser software and a page on the Internet?).	
2. Explain the difference between a subscription (fee-based database) and the free Internet.	
3. Identify keywords which describe the information need and use keywords as search terms (e.g., review search engine “help” page to determine methods for entering search terms).	
4. Use phrase searching in appropriate search engines to improve results.	
5. Incorporate place searching when searching for information using assigned directories and search engines.	

6. Evaluate Web information for: a Author's expertise (authority); b Accuracy of information presented; c Parameters of coverage (including objectivity and bias); and d Currency of information.	
7. Compare the range of information available from multiple information databases (e.g., examine the purpose and scope of each database and how it would be used for a particular assignment).	
Grade Seven	
1. Recognize that some Web information requires special software for its use (e.g., discuss what plug-ins are and how they expand the use of the Internet).	
2. Search a student-selected online directory or search engine by subject, keyword, author, title, date and/or format.	
3. Use Boolean operators in the search process (e.g., use Boolean logic to expand a search and to limit a search "AND," "OR" or "NOT").	
4. Perform searches for information in specific formats (e.g., graphics, images, journal articles).	
5. Compare information found in searches done on different types of Internet resources (e.g., directory, search engine, meta engine).	
6. Report elements of a Web site that make it effective (e.g., describe why the Web site is appropriate for the particular information needed).	
Grade Eight	
1. Troubleshoot error messages in a Web browser (e.g., verify the address, use refresh and/or stop buttons).	
2. Incorporate Boolean operators in the search process for curricular needs (e.g., know the basic Boolean operators and use them in a search).	
3. Compare information found in searches completed on different search engines (directories, spiders, meta crawlers) and discuss the differences in how search engines select, rank and display information: a Relevancy b Popularity; and c Paid placement	
4. Compare several Web sites on the same topic and evaluate the purpose of each site (e.g., use several sites for a specific curricular need and note whether the sites have similar or conflicting data).	

Benchmark D: Select, access and use appropriate electronic resources for a defined information need.	
Grade Six	
1. Demonstrate search techniques: author, title, subject for subscription (fee-based) databases.	
2. Use online library catalog to choose and locate a variety of resources on a topic.	
Grade Seven	
1. Compare search results through the use of different keywords (e.g., search for conservation information using “garbage” and search again using “waste disposal”).	
2. Examine information in different types of subscription (fee-based) databases to locate information for a curricular need (e.g., online encyclopedia, online subject dictionaries, magazine index, picture archive).	
Grade Eight	
1. Select research databases that align with identified information need (e.g., specialized databases on government, science, history, as needed for assignments).	
2. Retrieve information in different types of subscription (fee-based) databases to support information for a curricular need.	
3. Locate and use advanced search features and appropriate tools such as Boolean operators (“AND,” “OR,” or “NOT”) and a thesaurus in an online database.	

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.	
Benchmark A: Evaluate the aesthetic and functional components of a design and identify creative influences.	
Grade Six	
1. Describe how design is a creative planning process that leads to useful products and systems.	
2. Identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based on specific properties and characteristics (e.g., weight, strength, hardness and flexibility) for the design.	
3. Apply a design process to solve a problem in the classroom specifying criteria and constraints for the design (e.g., criteria include function, size and materials). Constraints include costs, time and user requirements.	
4. Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.	
5. Make the product or systems and document the design.	
6. Recognize that any design can be improved (e.g., old style scissors work but new ones with plastic on the finger holes are more comfortable and give more surface area for leverage).	
7. Diagram how design is iterative and involves a set of steps, which can be performed in different sequences and repeated as needed (e.g., identify need, research problem, develop solutions, select best solution, build prototype, test and evaluate, communicate, redesign).	
8. Investigate how products are created and communicate findings (e.g., interview an architect, industrial designer, contractor about the processes they follow).	

9. Identify inventors and designers around the world who contributed to the development of each of the technological systems.	
Grade Seven	
1. Evaluate examples of Universal Design use that meet common challenges individuals encounter (e.g., limitations concerning mobility, vision, strength, reach and clarity in communication).	
2. Describe how aesthetic and functional components both complement and conflict with each other (e.g., a brace to keep a bookcase from rocking may not be consistent with the beauty of the object).	
3. Review existing designs and suggest ways that they can be improved (e.g., how have food containers changed over time and how can they be improved?).	
4. Make two- and three-dimensional representations of the designed solution (e.g., 2-D includes sketches, drawings, and computer-assisted designs—CAD and 3-D includes graphic, mathematical and physical models).	
5. Describe how 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. Apply a design process to solve a problem in the school (e.g., identify need, research problem, develop solutions, select best solution, build prototype, test and evaluate, communicate, and redesign).	
7. Research and diagram the product development life cycle of an invention.	
8. Identify inventors and designers from antiquity who contributed to the development of each of the technological systems (e.g., contributions from Chinese, Greeks, Romans, Arabs, Egyptians and Renaissance in Europe).	
Grade Eight	
1. Identify environments or products that are examples of the application of the principles of Universal Design (e.g., equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, size and space for approach and use).	
2. Apply ergonomic considerations to a design to maximize a design's ease of use and to minimize product liability (e.g., ergonomic keyboards decrease wrist injury).	
3. Categorize the requirements for a design as either criteria or constraints.	
4. Document compromises involved in design (e.g., cost, material availability).	
5. Apply a design process to solve a problem in the community (e.g., identify need, research problem, develop solutions, select best solution, build prototype, test and evaluate, communicate, redesign).	
Benchmark B: Recognize the role of engineering design and of testing in the design process.	
Grade Six	
1. Describe how engineering design is a subset of the overall design process concerned with the functional aspect of the design.	
2. Examine how modeling, testing, evaluating and modifying are used to transform ideas into practical solutions (e.g., making adjustments to a model race vehicle to improve performance).	
3. Describe what an engineer does (e.g., analyze information found on engineering society Web sites).	

Grade Seven	
1. Summarize the role of engineering design.	
2. Describe the relationship between engineering, science and mathematics.	
3. Describe and test the characteristics of various materials (e.g., strength, color, conductivity).	
Grade Eight	
1. Explain how design involves a set of steps that can be performed in different sequences and repeated as needed (e.g., plan - do - study - act, problem analysis - design - coding and debugging - integration - testing and validation, define problem - identify options - identify best solution - plan how to achieve best solution - evaluate results).	
2. Identify how modeling, testing, evaluating and modifying are used to transform ideas into practical solutions.	
3. Test compression, tension and torsion strength of a material or system.	
Benchmark C: Understand and apply research, innovation and invention to problem-solving.	
Grade Six	
1. Examine how troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system (e.g., if after installing a switch in a circuit the light does not come on, how would you determine the problem?).	
2. Determine best use of recycled plastics in the manufacture of new products (e.g., using seven different plastic packaging resin code marked products).	
3. Recognize the patterns of the technological evolution of an invention (e.g., steam engines were invented, went through a period of rapid improvement, then a period of fine tuning and eventually were replaced by diesel/electric technology).	
4. Modify an existing product or system to improve it (e.g., something to improve storage in your locker).]	
Grade Seven	
1. Explain that understanding the function of an object requires a higher level of thinking than focusing on the object itself.	
2. Describe how some technological problems are best solved through experimentation.	
3. Describe and complete an experiment to evaluate the solution to a problem.	
4. Evaluate the credibility and applicability of information obtained to address a specific problem (e.g., what measurements should be used to build a chair or a piece of clothing? are they based on the prospective customers?).	
5. Discriminate between problems that do and do not have a technological solution (e.g., a recycling system and processes can be designed, but voluntary participation is a public attitude issue).	
6. Identify the patterns of technological invention (e.g., identify the patterns of invention in current products and systems).	

Grade Eight	
1. Explain the design axiom that form follows function.	
2. Invent a tool to solve a problem.	
3. Describe how invention is a process of turning ideas and imagination into devices and systems; and innovation is the process of modifying an existing product or system to improve it.	
4. Evaluate a variety of creativity-enhancing techniques.	
5. Describe how inventions can have multiple applications, some not originally intended.	
6. Identify the five levels of innovation and describe their characteristics: - a Apparent or conventional solution; - b Small invention inside paradigm; - c Substantial invention inside technology; - d Invention outside technology; and - e Discovery.	

Standard 7	
Designed World	
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.	
Benchmark A:	
Develop an understanding of, and be able to, select and use physical technologies.	
Grade Six	
1. Describe and use different energy storage devices.	
2. Describe how power systems are used to drive and provide propulsion to other technological products and systems.	
3. Describe how transporting people and goods involve an interdependence of individuals and vehicles (e.g., flying from Orlando to Cleveland involves transportation to the departure airport, transportation through the airport, the flight, and transportation from the destination airport).	
4. Identify and compare examples of transportation systems and devices that operate on each of the following: land, air, water and space.	
5. Produce a product using mechanical processes that change the form of materials through the processes of separating, forming, combining and conditioning them (e.g., build a solar cooker).	
6. Classify manufactured goods at home as durable and nondurable (e.g., appliances, furniture, clothing, fabrics).	
7. Explain and give examples of the impacts of interchangeable parts, components of mass-produced products, and the use of automation (e.g., robotics).	
8. Describe why it is important that structures rest on a solid foundation.	
9. Describe and explain parts of a structure (e.g., foundation, flooring, decking, wall, roofing systems).	

Grade Seven	
1. Understand that energy can be used to do work using many processes.	
2. Describe why it is important for personnel in energy and power technologies to constantly update their knowledge and skills.	
3. Understand that power is the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.	
4. Describe how transportation vehicles are made up of subsystems, such as structural, propulsion, suspension, guidance, control and support that must function together for a system to work effectively.	
5. Describe how licensure and certification are an integral part of transportation careers (e.g., commercial driver's license, safety inspector's pilot's license).	
6. Identify and manipulate the factors that influence vehicle performance (e.g., lift, drag, friction, thrust, pressure and gravity).	
7. Design, develop, fabricate and service a product (e.g., a pop bottle rocket, manufacture toys, clean computer keyboards).	
8. Analyze how marketing impacts the selection of the manufacturing process for a product.	
9. Safely disassemble a (possibly broken) product and describe what systems are inside, hypothesize how it was manufactured, and explain what materials were used and possibly how it works.	
10. Describe a manufacturing organization (e.g., corporate structure, research and development, production, marketing, quality control, distribution).	
11. Identify the components of various building subsystems (e.g., on pictures of classroom or various places in the school, label the electrical, lighting, HVAC, plumbing, communication and structural subsystems).	
12. Identify and construct a type of structure (e.g., a model bridge including arch, beam and suspension) and their appropriate uses (e.g., site, span, resources and load).	
Grade Eight	
1. Solve a problem involving energy and power systems (e.g., build a roller coaster for marbles, solar vehicles or solar cookers).	
2. Explore ways that energy can be used more efficiently (e.g., improved insulation to reduce heat loss, improved aerodynamics to reduce drag, improved engines to increase efficiency).	
3. Estimate and measure power consumption and compare estimates to actual measurements (e.g., compare real to the estimated energy bills at home).	
4. List the processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating and using conventions which are necessary for the entire transportation system to operate efficiently.	
5. Describe how governmental regulations influence the design and operation of transportation systems (e.g., seatbelts, airbags, noise levels).	
6. Describe why it is important for personnel in transportation technology to constantly update their knowledge and skills.	
7. Discuss how chemical technologies can be used in manufacturing processes (e.g., plastics, adhesives, insulation, personal care product).	
8. Describe the location and extraction of natural resources that are used in manufacturing processes (e.g., harvesting, drilling and mining).	

9. Explain and utilize basic processes in manufacturing systems (e.g., cutting, shaping, assembling, joining (including stitching), finishing, quality control and safety).	
10. Organize and implement an enterprise to manufacture a product.	
11. Describe how the selection of designs for structures is based on factors such as building laws and codes, including Americans with Disabilities Act concerns, style, convenience, cost, climate and function.	
12. Explain how the forces of tension, compression, torsion, bending and shear affect the performance of structures.	
13. Describe and model the effects of loads and structural shapes on structures	
Benchmark B: Develop an understanding of, and be able to, select and use informational technologies.	
Grade Six	
1. Describe how information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.	
2. Demonstrate the importance of a common language to express ideas through the use of symbols, measurements and drawings.	
Grade Seven	
1. Identify the source, encoder, transmitter, receiver, decoder and destination in communication systems.	
2. Solve a problem involving information and communication technological systems (e.g., prepare video presentation, set up a communication system between two points in the school).	
3. Identify and explain the appropriate tools, machines and electronic devices (e.g., drawing tools, computer-aided design, and cameras) used to produce and/or reproduce design solutions (e.g., engineering drawings, prototypes, and reports).	
Grade Eight	
1. Explain the factors that influence message design (e.g., intended audience, medium, purpose, budget and nature of message).	
2. Describe why it is important for personnel in information and communication technologies to constantly update their knowledge skills.	
Benchmark C: Develop an understanding of how bio-related technologies have changed over time.	
Grade Six	
1. List advances and innovations in medical technologies that are used to improve health care (e.g., prevention, diagnosis, treatment, rehabilitation).	
2. Describe why it is important for medical personnel to constantly update their knowledge and skills.	
3. Explain that there are a variety of diagnostic methods and treatments for a medical problem.	
4. Describe how advances in a variety of technological systems influence the development of medical devices.	
5. Describe how technological advances in agriculture directly affect the time and number of people required to produce food for a large population.	
6. Describe how biotechnology applies the principles of biology to develop commercial products or processes.	

Grade Seven	
1. Describe how the sanitation processes used in the disposal of medical products help to protect people from harmful organisms and disease, and shape the ethics of medical safety.	
2. Describe how previously discarded medical practices are sometimes reinstated.	
3. Recognize how the medicines we use affect our ongoing health and attitudes.	
4. Explain examples of adaptive or assistive devices (e.g., prosthetic devices, wheelchairs, eyeglasses, grab bars, hearing aids, lifts, braces, computer devices).	
5. Describe a wide range of specialized equipment and practices that are used to improve the production of food, fiber, fuel and the care of animals.	
6. Identify artificial ecosystems that are human-made complexes that replicate some aspects of the natural environment.	
7. Describe how agricultural products are used to produce fuels (e.g., converting corn to ethanol and soy beans to biodiesel).	
Grade Eight	
1. Relate how vaccines developed for use in immunization require specialized technologies to support/control environments in which a sufficient amount of vaccines are produced.	
2. Describe how licensure is an integral part of medical careers.	
3. Recognize the need for appropriate models in testing medicines and medical procedures (e.g., medicine testing that developed dosages for adult males but was used for children and females).	
4. Describe how technology is used to protect people from disease and illness, but can also aid their spread.	
5. Explain that the development of refrigeration, freezing, dehydration, preservation and irradiation allows for long-term storage of food and reduces the health risks caused by tainted food.	
6. Describe why it is important for personnel in agriculture and biotechnologies to constantly update their knowledge and skills.	