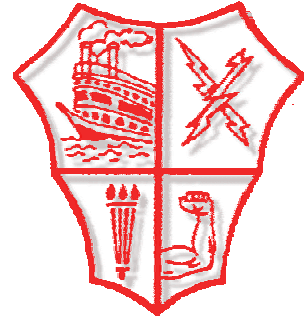


# OHIO ACADEMIC CONTENT STANDARDS TECHNOLOGY STANDARDS

Adopted from the Ohio Department of Education



## Grade 9

*New Richmond Exempted Village School District*

### Grade 9

Academic Correlation

#### Standard 1 ~ Nature of Technology

**Benchmark A: Synthesize information, evaluate and make decisions about technologies.**

1. Describe goal-directed research, define invention and innovation, and explain the relationship among them.

2. List and describe factors that may influence the development of technology.

3. Make informed choices among technology systems, resources and services.

**Benchmark B: Apply technological knowledge in decision-making.**

1. Demonstrate how the stability of a technological system is influenced by all system components, especially those in the feedback loop.

**Benchmark C: Examine the synergy between and among technologies and other fields of study when solving technological problems.**

1. Describe how technology transfer occurs when an innovation in one setting is applied in a different setting.

#### Standard 2 ~ Technology and Society Interaction

**Benchmark A: Interpret and practice responsible citizenship relative to technology.**

1. Explain how making decisions about the use of technology involves weighing the trade-offs between the positive and negative effects.

2. Understand that ethical considerations are important in the development, selection and use of technologies.

3. Review how different factors, such as individual curiosity, advertising, the strength of the economy, the goals of a company and the current trends, contribute to shaping the design of and demand for various technologies.

4. Understand how different cultures develop their own technologies to satisfy their individual and shared needs, wants and values.	
5. Provide examples of technology transfer from a government agency to private industry, and discuss the benefits (e.g., global positioning systems, also known as GPS).	
<b>Benchmark B: Demonstrate the relationship among people, technology and the environment.</b>	
1. Design, model/build and evaluate a plan/method for conserving resources.	
<b>Benchmark C: Interpret and evaluate the influence of technology throughout history, and predict its impact on the future.</b>	
1. Describe how technological development has been evolutionary, the result of a series of refinements to basic inventions or innovations over time.	
2. Select a technology or tool and predict how it will change in the future.	
<b>Benchmark D: Analyze ethical and legal technology issues and formulate solutions and strategies that foster responsible technology usage.</b>	
1. Practice responsible usage of technologies (e.g., download legally, install licensed software, adhere to copyright restrictions).	
2. Discuss access to information in a democratic society.	
<b>Benchmark E: Assess the impact of products and systems.</b>	
1. Collect information about products and systems and evaluate the quality of that information.	
2. Describe criteria for assessing the quality of information.	
3. Compare and contrast the past, present and future developments of a technological system.	
<b>Standard 3 ~ Technology for Productivity Applications</b>	
<b>Benchmark A: Integrate conceptual knowledge of technology systems in determining practical applications for learning and technical problem solving.</b>	
1. Identify strategies for identifying and solving routine hardware and software problems that occur during everyday use.	
2. Explore state-of-the-art devices to store data that will be used for researching projects.	
3. Create a design for a basic network and list skills needed to manage networks.	
<b>Benchmark B: Identify, select and apply appropriate technology tools and resources to produce creative works and to construct technology-enhanced models.</b>	
1. Demonstrate proficiency in all productivity tools (e.g., word processing, spreadsheet, database, desktop publishing).	
2. Identify and use input and output devices to operate and interact with computers and multimedia technology resources.	
<b>Standard 4 ~ Technology and Communication Applications</b>	
<b>Benchmark A: Apply appropriate communication design principles in published and presented projects.</b>	
1. Format text, select color, insert graphics and include multimedia components in student-created media/communication products.	

2. Examine how and why image, language, sound and motion convey specific messages designed to influence the audience.	
3. Modify electronic publications and other communication products to meet accessibility guidelines so that access to information is not limited.	
4. Assess the accuracy of the communication product.	
<b>Benchmark B: Create, publish and present information, utilizing formats appropriate to the content and audience.</b>	
1. Use e-mail in a teacher-moderated discussion group and in threaded discussion lists.	
2. Use technology to publish information in electronic form (e.g., Web, multimedia, digital video, electronic portfolio).	
3. Validate use of communication techniques.	
<b>Benchmark C: Identify communication needs, select appropriate telecommunication tools and design collaborative interactive projects and activities to communicate with others, incorporating emerging technologies.</b>	
1. Demonstrate communication clarity and use elements and formats of e-mail to communicate with others (e.g., discussion lists, message boards, chat).	
2. Identify and use appropriate telecommunication tool to collaborate with others (e.g., presentation, Web site, digital video).	
3. Investigate the uses of video-conferencing, Web casting, and other distance-learning technologies (e.g., interviews, meetings, course work).	
4. Develop collaborative online projects to research a problem and disseminate results.	
<b>Standard 5 ~ Technology and Information Literacy</b>	
<b>Benchmark A: Determine and apply an evaluative process to all information sources chosen for a project.</b>	
1. Define terms which determine information validity: a. Accuracy; b. Authority; c. Objectivity; d. Currency; e. Coverage.	
2. Determine the author's authority for all resources and identify points of agreement and disagreement among sources.	
<b>Benchmark B: Apply a research process model to conduct research and meet information needs.</b>	
1. Determine the essential questions and plan research strategies.	
2. Select and evaluate appropriateness of information from a variety of resources, including online research databases and Web sites to answer the essential questions.	
3. Integrate copyrighted information into an information product, following appropriate use guidelines (e.g., quote using proper citation format, request permission for use).	
4. Identify relevant facts, check facts for accuracy and record appropriate information.	
5. Incorporate a list of sources used in a project using a standard bibliographic style manual (e.g., MLA and APA Style Manuals).	

6. Evaluate the research process and product as they apply to the information need (e.g., does the process reflect the actual information need).	
<b>Benchmark C: Formulate advanced search strategies, demonstrating an understanding of the strengths and limitations of the Internet, and evaluate the quality and appropriate use of Internet resources.</b>	
1. Identify multiple directories and search engines matching curricular need (e.g., given an assignment, use knowledge of tools to pick an appropriate tool to search for information).	
2. Construct search strategies focused on the retrieval of specific search results by incorporating Boolean operators (AND, OR, NOT) and adjacency/proximity techniques.	
3. Compare and chart the search results from multiple Web sites to check for consistency of information (e.g., compare data on acid rain from more than one site).	
4. Establish a criteria for evaluating the information retrieved through Internet searching: author's expertise, bias, coverage of topic and timeliness.	
<b>Benchmark D: Evaluate choices of electronic resources and determine their strengths and limitations.</b>	
1. Integrate search strategies within the electronic resource that targets retrieval for specific information need (e.g., limit by date of publication, focus on specific format such as image, sound file).	
2. Review strengths and weaknesses of various types of electronic resources for research need (e.g., compare subject specific magazine database to general online index of articles).	
3. Demonstrate the difference between databases, directories, and database archives (e.g., free vs. fee-based, delivery mechanism (CD, DVD, Network, Internet), and general vs. specific discipline).	
4. Select a specific database for an assignment and explain why it is the appropriate one to use (e.g., in researching a particular author, use a literary database of biographical and critical information about writers).	
<b>Standard 6 ~ Design</b>	
<b>Benchmark A: Identify and produce a product or system using a design process and evaluate the final solution and communicate findings.</b>	
1. Explain that design problems are seldom presented in a clearly defined form (e.g., problems often involve competing constituencies, undiscovered constraints, and unidentified regulations).	
2. Brainstorm problem solutions using common brainstorming techniques (e.g., select a leader, select a recorder, generate ideas, discuss and add-on to ideas of others and recognize all ideas are welcome).	
3. Identify the conceptual and technical principles that underpin design processes (e.g., the concept of contradiction, concepts of constraints, separation principles, necessary condition logic instructions, and sufficient cause logic instructions).	
4. Explain and apply the methods and tools of inventive problem solving to develop and produce a product or system.	

5. Demonstrate knowledge of pictorial and multi-view drawings (e.g., orthographic projection, isometric, oblique, perspective; using proper techniques).	
6. Identify the elements of quality in a product/system (e.g., tolerances, fit, finish, function, form (aesthetics), repeatability, durability, material).	
7. Define simulation in the design process.	
8. Describe how the technological systems of manufacturing, construction, information and communication, energy and power, transportation, medical, and agricultural, and related biotechnologies can be used to solve practical problems.	
9. Recognize that patent, trademark and copyright law protect technological ideas and intellectual property.	
<b>Benchmark B: Recognize the role of teamwork in engineering design and of prototyping in the design process.</b>	
1. Explain how established design principles are used to evaluate existing designs, collect data, and guide the design process (e.g., design principles include flexibility, unity, emphasis, balance, function, and proportion).	
2. Explain the different engineering disciplines and how they relate to the major technology systems.	
3. Explain how a prototype is a working model used to test a design concept by making actual observations and necessary adjustments.	
4. Describe how engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.	
5. Identify the factors that must be taken into account in the process of engineering design (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors in engineering, such as ergonomics).	
6. Describe the importance of teamwork, leadership, integrity, honesty, work habits and organizational skills in the design process.	
7. Create a model of a design solution to an engineering problem (e.g., physical, graphic, or mathematical model).	
<b>Benchmark C: Understand and apply research, development, and experimentation to problem solving.</b>	
1. Describe how business and industry use research and development, to prepare devices and systems for the marketplace.	
2. Research consumer preferences for a new product.	
3. Explain that function is the purpose for which a product/system was designed and that focus on the function will expand the space in which solutions are available.	
4. Identify factors that inhibit creativity (e.g., perceptual, emotional, cultural, functional, environment).	
5. Identify and apply a variety of conceptual block-busting techniques (ideation) (e.g., goal charting, bug lists, brainstorming, forced connections, and attribute listing).	

## Standard 7 ~ Designed World

### Benchmark A: Classify, demonstrate, examine, and appraise energy and power technologies.

1. Describe and demonstrate ways that energy can be converted from one form to another (e.g., heat to electrical, electrical to mechanical, electrical to heat).

2. Use and evaluate renewable and nonrenewable resources to operate a mechanism (e.g., petroleum, coal, biomass, and solar).

3. Describe the careers available in energy and power technology systems and the training needed to pursue them.

4. Differentiate between hydraulic and pneumatic systems and provide examples of appropriate applications of each as they relate to manufacturing and transportation systems.

5. Identify the differences between open and closed thermal systems (e.g., humidity control systems, heating systems, cooling systems).

6. Measure voltage, resistance, and current in electrical systems and describe the different instruments used.

7. Describe the application of the first and second laws of thermodynamics (e.g., the concept and function of a heat engine).

8. Identify and apply appropriate safety measures when working with energy and power technologies.

9. Investigate emerging (state-of-the-art) and innovative applications of energy and power technology.

10. Identify and investigate AC and DC circuits (e.g., sources, conductors, controls, loads, applications, purposes, safety, components, symbols, principles and operations).

11. Employ energy and power technologies to resolve practical problems (e.g., efficient power production, conversion and transmission).

### Benchmark B: Classify, demonstrate, examine, and appraise transportation technologies.

1. Describe the vital role transportation plays in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture (e.g., subsystems of aviation, rail transportation, water transportation, pedestrian walkways, roadways).

2. Describe the careers available in transportation technology systems and the education needed to pursue them.

3. Identify and apply appropriate safety measures when working with transportation technologies.

4. Employ transportation technologies to resolve practical problems (e.g., getting students to athletic events).

### Benchmark C: Classify demonstrate, examine and appraise manufacturing technologies.

1. Classify materials as natural, synthetic, or mixed (e.g., wood, plastic, cotton/polyester blend fabric).

2. Produce a product using the manufacturing system appropriate to the context (e.g., customized production, batch production, and continuous production).

3. Identify and investigate a variety of technological tools, equipment, machines, materials and technical processes used in manufacturing technologies to manufacture/fabricate products or systems.	
4. Identify and apply appropriate safety measures when working with manufacturing technologies.	
5. Investigate emerging (state-of-the-art) and innovative applications of manufacturing technology.	
6. Employ manufacturing technologies to resolve practical problems (e.g., produce a product).	
<b>Benchmark D: Classify, demonstrate, examine and appraise construction technologies.</b>	
1. Describe the importance of infrastructure in a construction system (e.g., how utilities and roads are extended into a parcel of land when it is developed).	
2. Distinguish among the different forces acting upon structural components (e.g., tension, compression, shear and torsion).	
3. Differentiate the factors that affect the design and building of structures (e.g., material availability, zoning laws, building codes, and professional standards).	
4. Identify and use a variety of technological tools, equipment, machines, materials, and technical processes used in construction technologies to build/construct products or systems.	
5. Identify and apply appropriate safety measures when working with construction technologies.	
6. Employ construction technologies to resolve practical problems (e.g., a shelter for a pet, emergency shelter for disaster victims).	
<b>Benchmark E: Classify, demonstrate, examine and appraise information and communication technologies.</b>	
1. Use a variety of information and communication technologies to demonstrate the inputs, processes, and outputs associated with sending and receiving information (e.g., computer and related devices, graphic (technical and communication) media, electronic transmitters and receiving devices, entertainment products, and various other systems).	
2. Describe the careers available in information and communication technology systems and the training needed to pursue them.	
3. Identify and apply appropriate safety measures when working with information and communication technologies (e.g., making sure that power is disconnected before working on the internal parts of a computer and taking proper static safeguards, protection from the effects of electromagnetic radiation).	
4. Describe the factors that influence the cost of producing technological products and systems in information and communication technologies.	
5. Investigate emerging (state-of-the-art) and innovative applications of information and communication technology.	

6. Employ information and communication technologies to resolve practical problems (e.g., providing radio communication at a school function, communicating a school event to the community).	
<b>Benchmark F: Classify, demonstrate, examine and appraise medical technologies.</b>	
1. Describe how the design process can be used to produce technological products to replace or repair human physical structures (e.g., prostheses, DNA therapy, pacemakers, lasers).	
2. Appraise the careers available in medical technology systems and the training needed to pursue them.	
3. Examine new sensing technologies being used to diagnose medical conditions less invasively (e.g., CT-Scan, MRI, MRA).	
4. Identify and apply appropriate safety measures when working with medical technologies.	
5. Identify and apply appropriate codes, laws, standards, or regulations related to medical technologies (e.g., Occupational Safety and Health Administration (OSHA), National Electric Code (NEC), International Standards Organization (ISO).	
6. Investigate emerging (state-of-the-art) and innovative applications of medical technologies.	
<b>Benchmark G: Classify, demonstrate, examine, and appraise agricultural and related biotechnologies.</b>	
1. Describe how agriculture includes a combination of organizations that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products (e.g., individuals, corporations, financial institutions, and local, state, and federal governments).	
2. Evaluate the training required for various careers in agricultural and biotechnology systems (e.g., chemical applicators, farmer, plant biologist, groundskeeper).	
3. Identify and apply appropriate safety measures when working with agricultural and related biotechnologies.	
4. Investigate emerging (state-of-the-art) and innovative applications of agricultural and related biotechnologies.	