Maryland Technology Education Standards

Grades 6-8

The Nature of Technology - Students will develop an understanding of the nature of technology. 6-8.1

1 **The characteristics and scope of technology.** 6-8.1.1

- a Differentiate between technological inventions and innovations. 6-8.1.1.A
- b Identify the need for technological invention and innovation. 6-8.1.1.B
- c Describe how marketing and advertising is used to create demand for technological products (STL, 3I). 6-8.1.1.C

2 **Core Concepts of Technology** 6-8.1.2

- a Describe the components of a technological system. 6-8.1.2.A
- b Design a model that demonstrates how subsystems and system elements interact within systems. 6-8.1.2.B
- c Select or design a technological system to perform a task based on specific requirements. 6-8.1.2.C
- d Assemble and operate simple technological systems. 6-8.1.2.D
- e Analyze the performance of a feedback control system. 6-8.1.2.E
- f Troubleshoot a malfunctioning system (STL, 10F). 6-8.1.2.F
- g Use tools, materials, and machines safely to diagnose, adjust and repair systems (STL, 12I). 6-8.1.2.G
- h Provide examples of optimization and trade-offs for products, processes, and systems. 6-8.1.2.H

3 **Connections Between Technology and Other Fields of Study** 6-8.1.3

- a Analyze how knowledge gained from other fields of study has impacted the development of technological products and systems (STL, 3F). 6-8.1.3.A
- b Describe how patents protect intellectual property (STL, 3I). 6-8.1.3.B
- c Assess the limitations of open source technology. 6-8.1.3.C

Impacts of Technology - Students will evaluate the impact of technology. The impact of technology incorporates 6-8.2

1 **Effects of Technology** 6-8.2.1

- a Discriminate between responsible and irresponsible use of technology. 6-8.2.1.A
- b Analyze the cultural, social, economic, political and environmental effects of technology. 6-8.2.1.B
- c Describe legal and ethical concerns resulting from the development and use of technology (STL, F). 6-8.2.1.C
- d Explain that decisions about the use of technology involve trade-offs between positive and negative effects (STL, 4I). 6-8.2.1.D
- e Assess the impact of technology transfer from one society to another (STL, 4K). 6-8.2.1.E
- f Evaluate the advantages and disadvantages of technology. 6-8.2.1.F

2 **Role of Society in the Development and Use of Technology** 6-8.2.2

- a Describe how new technologies have evolved as a result of combing existing technologies. 6-8.2.2.A
- b Assess the impact that technological invention and innovation has on the needs and wants of a society (STL, 4E). 6-8.2.2.B
- c Explain how technological advances have impacted the nature of work. 6-8.2.2.C

Engineering Design and Development - Students will demonstrate knowledge of and apply the engineering design process to develop solutions to problems. 6-8.3

3 **Engineering Design and Development - Students will demonstrate knowledge of and apply the engineering design process to develop solutions to problems.** 6-8.3

Explain how the design process is an iterative, systematic approach to problem solving that includes collaboratively: 6-8.3.1.A

1 **Defining a problem – students will be able to employ technical reading and writing skills to develop concise problem statement.** 6-8.3.1.A.1

2 **Brainstorming – students will be able to apply team brainstorming rules and techniques.** 6-8.3.1.A.2

3 **Researching and Generating Ideas – students will be able to conduct research to assess prior solutions to the problem.** 6-8.3.1.A.3

4 **Identifying Criteria and Specifying Constraints – students will be able to assess the criteria (guidelines) and prioritize constraints (limitations) of the problem. This includes people, time, materials, capital, energy, etc.** 6-8.3.1.A.4

5 **Exploring Possibilities – students will conduct research and explore possibilities for potential solutions.** 6-8.3.1.A.5

	6 Selecting an Approach – students will be able to employ a decision matrix to select the best approach to solve the problem. 6-8.3.1.A.6
	7 Developing a Design Proposal – students will be able to create a plan of action that details the specifics of the project. 6-8.3.1.A.7
	8 Making a Model or a Prototype – students will be able to develop conceptual, mathematical, or physical models and/or a prototype that performs the final solution and can be used for testing/evaluating. This includes the creation of two and three dimensional scale drawings. 6-8.3.1.A.8
	9 Testing and Evaluating Design Using Specifications – students will be able to use establish specifications to assess their design product. 6-8.3.1.A.9
	10 Refining a Design – student will employ data-driven decision making to improve their product. 6-8.3.1.A.10
	11 Creating or Making the Product – students will be able to produce the design product 6-8.3.1.A.11
	12 Communicate Processes and Results – students will be able to communicate throughout the design process demonstrating application of the essential skills and knowledge presented in Maryland's College and Career Ready Disciplinary Literacy Standards. 6-8.3.1.A.12
Apply the design process to develop solutions to real-world problems. 6-8.3.1.B	b Apply the design process to develop solutions to real-world problems. 6-8.3.1.B
Document the design process and solutions in a journal, notebook, or portfolio. 6-8.3.1.C	c Document the design process and solutions in a journal, notebook, or portfolio. 6-8.3.1.C
Assess the reliability and validity of researched information. 6-8.3.1.D	d Assess the reliability and validity of researched information. 6-8.3.1.D
Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of a problem (MS-ETS1-2). 6-8.3.1.E	e Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of a problem (MS-ETS1-2). 6-8.3.1.E

Discriminate between ethical and unethical engineering practices. 6-8.3.1.F

f **Discriminate between ethical and unethical engineering practices.** 6-8.3.1.F

Core Technologies and The Designed World - Students will demonstrate knowledge of the core technologies that underpin the designed world and major enterprises that produce the goods and services of the designed world. Core technologies include but are not limited to biotechnology, electrical, electronics, fluid, material, mechanical, optical, structural, and thermal technologies. Major enterprises include medical, agriculture, biotechnology, energy and power, information and communication, transportation, and manufacturing and construction technologies. 6-8.4

1 **Medical Technologies** 6-8.4.1

- a Explore the function and application of several medical technologies. 6-8.4.1.A
- b Correlate advances in medical technologies to improvements in the length and quality of life for multicellular organisms. 6-8.4.1.B
- c Describe ethical considerations involved in the development and application of medical technologies. 6-8.4.1.C

2 **Agricultural Technologies** 6-8.4.2

- a Explore the function and application of a variety of technological processes, equipment, and systems used in agriculture (e.g. agroforestry, irrigation, global positioning systems). 6-8.4.2.A
- b Design, develop, use, manage, maintain, and assess a closed system that supports living organisms (e.g. terrarium, hydroponics station). 6-8.4.2.B
- c Evaluate the positive and negative effects of technological solutions to agricultural problems. 6-8.4.2.C
- d Describe techniques used to provide longterm storage of food and reduce the health risk caused by tainted food (STL, 15J). 6-8.4.2.D

3 **Biotechnology** 6-8.4.3

- a Explore applications of biotechnology 6-8.4.3.A
- b Examine positive and negative impacts of biotechnology. 6-8.4.3.B
- c Analyze ethical, societal, and legal issues that arise from biotechnology applications. 6-8.4.3.C

4 **Energy and Power Technologies** 6-8.4.4

- a Analyze how power systems are used to drive and provide propulsion to other technological products and systems (STL, 16H). 6-8.4.4.A
- b Design, construct, and test a device that either minimizes or maximizes energy transfer (MS-PS3-3). 6-8.4.4.B
- c Explore ways to conserve energy. 6-8.4.4.C
- d Assess advantages and disadvantages of different forms of renewable and nonrenewable energy. 6-8.4.4.D

5 Information and Communication Technologies 6-8.4.5

- a Assess the application and functionality of the parts of a communication system (source, encoder, transmitter, receiver, decoder, and destination) (STL, 17H). 6-8.4.5.A
- b Explore different steps in the communication process (encode message, encoded message is transmitted or switched through a channel, message is received and decoded by the receiver). 6-8.4.5.B
- c Design and send messages using various types of communication systems. 6-8.4.5.C
- d Design and develop a simple communications system. 6-8.4.5.D

6 Transportation Technologies 6-8.4.6

- a Investigate the functionality of various methods of transportation for land, water, air, and space. 6-8.4.6.A
- b Assess processes necessary for an entire transportation system to operate efficiently (e.g. receiving, holding, storing, loading) (STL, 18I). 6-8.4.6.B
- c Analyze the interdependence of transportation systems. 6-8.4.6.C
- d Design and develop models of subsystems in a transportation system (structural, propulsion, suspension, guidance, control, and support). 6-8.4.6.D
- e Design and develop a model of a new energy efficient vehicle to be use on land, in the sea, in the air, or in space. 6-8.4.6.E
- f Describe how governmental regulations influence the design and operation of transportation system. 6-8.4.6.F

7 Manufacturing Technologies 6-8.4.7

- a Identify the components of a manufacturing system. 6-8.4.7.A
- b Identify resources required for manufacturing systems to operate properly (e.g. raw materials, finances, people, tools, machines, time). 6-8.4.7.B
- c Examine the mechanical and chemical processes of manufacturing. 6-8.4.7.C
- d Analyze the development, production, application, marketing, acquisition, and disposal of manufactured products. 6-8.4.7.D
- e Assess the impact that technology (e.g. computer-aided design, automation, robots, assembly lines) has on the manufacturing process. 6-8.4.7.E
- f Assess the impact that the manufacturing process has on people and the environment. 6-8.4.7.F
- g Classify manufactured goods according to their longevity. 6-8.4.7.G
- h Assess a variety of manufacturing methodologies. 6-8.4.7.H

	8 Construction Technologies 6-8.4.8 a Analyze the type of and purpose for a variety of structures. 6-8.4.8.A b Analyze factors used in the selection of designs for structures (e.g. laws, codes, style, cost, climate, function) (STL, 20F). 6-8.4.8.B c Examine different subsystems within buildings. 6-8.4.8.C d Analyze the maintenance of structures and subsystems. 6-8.4.8.D e Assess the role that community planning, laws, and regulation have in the development and maintenance of structures. 6-8.4.8.E f Design, use, and assess building material. 6-8.4.8.F g Design and create models of structures. 6-8.4.8.G
Analyze the function of select core technologies in the designed world. 6-8.3.1.G	**g Analyze the function of select core technologies in the designed world.** 6-8.3.1.G
Computational Thinking and Computer Science Applications - Students will be able to apply computational thinking skills and computer science applications as tools to develop solutions to engineering problems. 6-8.5	**5 Computational Thinking and Computer Science Applications - Students will be able to apply computational thinking skills and computer science applications as tools to develop solutions to engineering problems.** 6-8.5
Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems. 6-8.5.1.A	**a Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems.** 6-8.5.1.A
Use the basic steps in algorithmic problem solving to design solutions to problems. 6-8.5.1.B	**b Use the basic steps in algorithmic problem solving to design solutions to problems.** 6-8.5.1.B
Use modeling and simulation to represent and understand natural phenomena. 6-8.5.1.C	**c Use modeling and simulation to represent and understand natural phenomena.** 6-8.5.1.C

Implement problem solutions using a programming language. 6-8.5.1.D	**d** **Implement problem solutions using a programming language.** 6-8.5.1.D
Use productivity technology tools for individual and collaborative writing, communication, presentation, and/or publishing activities. 6-8.5.1.E	**e** **Use productivity technology tools for individual and collaborative writing, communication, presentation, and/or publishing activities.** 6-8.5.1.E
Apply responsible legal and ethical behaviors in the use of technology systems and software. 6-8.5.1.F	**f** **Apply responsible legal and ethical behaviors in the use of technology systems and software.** 6-8.5.1.F
Analyze how computational thinking and computer programing can be used as tools for problem solving. 6-8.5.1.G	**g** **Analyze how computational thinking and computer programing can be used as tools for problem solving.** 6-8.5.1.G