

**Project Lead the Way: Digital Electronics, (DE) Grades 9-12**

Standards		Benchmarks	Activities/Examples
1. Students will develop an understanding of the characteristics and scope of technology.	J	The nature and development of technological knowledge and processes are functions of the setting.	Students will learn the foundation of electronics and the soldering process. Students will learn and be tested on combinational logic and programmable logic. Students will learn and be tested on sequential logic.
	K	The rate of technological development and diffusion is increasing rapidly.	Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
2. Students will develop an understanding of the core concepts of technology.	I	Tools are used to design, make, use, and assess technology.	Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
	J	Materials have many different properties.	Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
	W	Systems thinking applies logic and creativity with appropriate compromises in complex real-life problems.	Students will learn the foundation of electronics and the soldering process.
			Introduction to analog and digital electronics.
			Students will learn and be tested on combinational logic and programmable logic.
			Students will learn and be tested on sequential logic.
	X	Systems, which are the building blocks of technology, are embedded within larger technological, social, and environmental systems.	Introduction to analog and digital electronics.
			Students will learn and be tested on sequential logic.
			Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
	Y	The stability of a technological system is influenced by all of the components in the system, especially those in the feedback loop.	Introduction to analog and digital electronics.
Students will learn and be tested on combinational logic and programmable logic.			
Students will learn and be tested on sequential logic.			
Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).			
CC	New technologies create new processes.	Students will learn and be tested on combinational logic and programmable logic. Students will learn and be tested on sequential logic.	
FF	Complex systems have many layers of controls and feedback loops to provide information.	Introduction to analog and digital electronics.	
		Students will learn and be tested on combinational logic and programmable logic.	
		Students will learn and be tested on sequential logic.	
		Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).	

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3. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.	H Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.	Students will learn and be tested on sequential logic.
	J Technological progress promotes the advancement of science and mathematics.	Students will learn the foundation of electronics and the soldering process.
		Introduction to analog and digital electronics.
		Students will learn and be tested on combinational logic and programmable logic.
4. Students will develop an understanding of the cultural, social, economic, and political effects of technology.	H Changes caused by the use of technology can range from gradual to rapid and from subtle to obvious.	Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
		Students will learn and be tested on combinational logic and programmable logic.
		Students will learn and be tested on sequential logic.
5. Students will develop an understanding of the effects of technology on the environment.	I With the aid of technology, various aspects of the environment can be monitored to provide information for decision-making.	Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
	K Humans devise technologies to reduce the negative consequences of other technologies.	Students will learn and be tested on combinational logic and programmable logic.
	L Decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.	Students will learn and be tested on sequential logic.

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7. Students will develop an understanding of the influence of technology on history.	G	Most technological development has been evolutionary, the result of a series of refinements to a basic invention.	Introduction to analog and digital electronics. Students will learn and be tested on combinational logic and programmable logic.
	N	The Industrial Revolution saw the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time.	Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
	O	The Information Age places emphasis on the processing and exchange of information.	Students will learn and be tested on sequential logic.
8. Students will develop an understanding of the attributes of design.	H	The design process includes defining a problem, brainstorming, researching an degenerating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.	Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
	K	Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.	Students will learn and be tested on combinational logic and programmable logic. Students will learn and be tested on sequential logic.
9. Students will develop an understanding of engineering design.	K	A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.	Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
	L	The process of engineering design takes into account a number of factors.	Students will learn and be tested on combinational logic and programmable logic. Students will learn and be tested on sequential logic.

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10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.	I	Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	Students will learn the foundation of electronics and the soldering process.
			Introduction to analog and digital electronics.
	L	Many technological problems require a multidisciplinary approach.	Students will learn and be tested on sequential logic.
			Students will learn and be tested on combinational logic and programmable logic.
11. Students will develop the abilities to apply the design process.	M	Identify the design problem to solve and decide whether or not to address it.	Students will learn and be tested on combinational logic and programmable logic.
			Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
	O	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.	Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
12. Students will develop the abilities to use and maintain technological products and systems.	N	Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	Introduction to analog and digital electronics.
			Students will learn and be tested on combinational logic and programmable logic.
			Students will learn and be tested on sequential logic.
			Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).
13. Students will develop the abilities to assess the impact of products and systems.	L	Use assessment techniques, such as trend analysis and experimentation, to make decisions about the future development of technology.	Introduction to microcontrollers. Students will learn programming, flowcharting, and apply those skills to a robot. (Boe-Bot).

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16. Students will develop an understanding of and be able to select and use energy and power technologies.	K	Energy can be grouped into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others.	Introduction to analog and digital electronics.
	N	Power systems must have a source of energy, a process, and loads.	Students will learn the foundation of electronics and the soldering process.
17. Students will develop an understanding of and be able to select and use information and communication technologies.	L	Technological knowledge and processes are communicated using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.	Students will learn the foundation of electronics and the soldering process.
			Students will learn and be tested on combinational logic and programmable logic.
			Students will learn and be tested on sequential logic.
	P	There are many ways to communicate information, such as graphic and electronic means.	Introduction to analog and digital electronics.
	L	The design of structures includes a number of requirements.	Students will learn and be tested on combinational logic and programmable logic.
20. Students will develop and understanding of and be able to select and use construction technologies.			