PRE-REQUISITE(S)

Software Set-up for micro:bit

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
• Editor • Firmware • Flash • micro:bit • Microbit • Module • Python	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3			*Practices* P4. Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P5. Creating Computational Artifacts. 3 *Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 1 *Systematically test computational artifacts by considering all scenarios and using test cases.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* *Concepts* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.* To 12. Computing Systems: Troubleshooting *Troubleshooting complex problems involves the use of multiple sources when researching, evaluating, and implementing potential solutions. Troubleshooting also relies on experience, such as when people recognize that a problem is similar to one*	(CRP) Career Ready Practices 2. Apply appropriate academic skills 11. Use technology to enhance productivity (ST) Stem Careers 2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 3. Apply processes and concepts for the use of technological tools in STEM. (IT-PRG) Programming & Software Dev. 3. Analyze system and software requirements to ensure maximum operating efficiency. 6. Program a computer application using the appropriate programming language.	Self-direction Technology Use

	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*.			*they have seen before or adapt solutions that have worked in the past.* To 12. Algorithms and Programming: Control *Programmers consider tradeoffs related to implementations, readability, and program performance when selecting and combining control structures.* To 12. Impacts of Computing: Modularity *Complex programs are designed as systems of interacting modules, each with a specific role, coordinating for a common overall purpose. These procedures; or independent, but interrelated, programs. Modules allow for better management of complex tasks.* To 12. Impacts of Computing: Program Development *Diverse teams can develop programs with a broad impact through careful review and by drawing on the strengths of members in different roles. Design decisions often involve tradeoffs. The development of complex programs is aided by resources such as libraries and tools to edit and manage parts of the program. Systematic analysis is critical for identifying the effects of lingering bugs.*		

	CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.					

Writing micro:bit Programs

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
• Comment (line, block, docstring) • Condition • Constant • Declaration • Documenting • Floating point • Function • LED matrix • Loop • Method • micro:bit • Modulus • Object • Operators (arithmetic, comparison, boolean, assignment, binary, ternary) • Parameter • Pixel • Script • Strings • Variable (global, local)	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently.	CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively. CCSS.MATH.PRACTICE.MP6 Attend to precision.		*Practices* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P4. Developing and Using Abstractions. 3 *Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.* P5. Creating Computational Artifacts. 1 *Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations* P5. Creating Computational Artifacts. 2 *Create a computational artifact for practical intent, personal expression, or to address a societal issue.* P5. Creating Computational Artifacts. 3 *Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 1 *Systematically test computational artifacts by considering all scenarios and using test cases.*	(CRP) Career Ready Practices 2. Apply appropriate academic skills 11. Use technology to enhance productivity (ST) Stem Careers 2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 1. Use STEM concepts and processes to solve problems involving design and/or production. (IT-PRG) Programming & Software Dev. 6. Program a computer application using the appropriate programming language.	Self-direction Technology Use Critical-thinking Reflection Revision Design-thinking

	CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. CCSS.ELA-LITERACY.RST.11-12.3			P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* P6. Testing and Refining Computational Artifacts. 3 *Evaluate and refine a computational artifact multiple times to enhance its performance, reliability, usability, and accessibility.* P7. Communicating About Computing. 2 *Describe, justify, and document computational processes and solutions using appropriate terminology consistent with the intended audience and purpose.* *Concepts* To 12. Computing Systems: Devices *Computing devices are often integrated with other systems, including biological, mechanical, and social systems. These devices can share data with one another. The usability, dependability, security, and accessibility of these devices, and the systems they are integrated with, are important considerations in their design as they evolve.* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.* To 12. Computing Systems: Troubleshooting *Troubleshooting complex problems involves the use of multiple sources when researching, evaluating, and implementing potential solutions. Troubleshooting also relies on experience, such as when people recognize that a problem is similar to one they have seen before or adapt solutions that have worked in the past.*		

	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*. CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.			To 12. Algorithms and Programming: Algorithms *People evaluate and select algorithms based on performance, reusability, and ease of implementation. Knowledge of common algorithms improves how people develop software, secure data, and store information.* To 12. Algorithms and Programming: Variables *Data structures are used to manage program complexity. Programmers choose data structures based on functionality, storage, and performance tradeoffs.* To 12. Algorithms and Programming: Control *Programmers consider tradeoffs related to implementations, readability, and program performance when selecting and combining control structures.* To 12. Impacts of Computing: Modularity *Complex programs are designed as systems of interacting modules, each with a specific role, coordinating for a common overall purpose. These procedures; or independent, but interrelated, programs. Modules allow for better management of complex tasks.* To 12. Impacts of Computing: Program Development *Diverse teams can develop programs with a broad impact through careful review and by drawing on the strengths of members in different roles. Design decisions often involve tradeoffs. The development of complex programs is aided by resources such as libraries and tools to edit and manage parts of the program. Systematic analysis is critical for identifying the effects of lingering bugs.*		

Add Modules to Your micro:bit

Concepts Vocabulary	**Common Core State Standards (ELA)[2]**	**Common Core State Standards (Math)[2]**	**Next Generation Science Standards (NGSS)[4]**	**K-12 Computer Science Framework[1]**	**Career Technical Education Standards (CTE)[3]**	**21st Century Competencies**

• cyberbot • cyber:bot • File system • Library	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and			*Practices* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* *Concepts* To 12. Computing Systems: Devices *Computing devices are often integrated with other systems, including biological, mechanical, and social systems. These devices can share data with one another. The usability, dependability, security, and accessibility of these devices, and the systems they are integrated with, are important considerations in their design as they evolve.* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.* To 12. Computing Systems: Troubleshooting *Troubleshooting complex problems involves the use of multiple sources when researching, evaluating, and implementing potential solutions. Troubleshooting also relies on experience, such as when people recognize that a problem is similar to one they have seen before or adapt solutions that have worked in the past.* To 12. Impacts of Computing: Modularity *Complex programs are designed as systems of interacting modules, each with a specific role, coordinating for a common overall purpose. These procedures; or independent,*	(CRP) Career Ready Practices 2. Apply appropriate academic skills 11. Use technology to enhance productivity (ST) Stem Careers 2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (IT-PRG) Programming & Software Dev. 6. Program a computer application using the appropriate programming language.	Technology Use

	phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*. CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend			*but interrelated, programs. Modules allow for better management of complex tasks.* To 12. Impacts of Computing: Program Development *Diverse teams can develop programs with a broad impact through careful review and by drawing on the strengths of members in different roles. Design decisions often involve tradeoffs. The development of complex programs is aided by resources such as libraries and tools to edit and manage parts of the program. Systematic analysis is critical for identifying the effects of lingering bugs.*		

	science/technical texts in the grades 11-CCR text complexity band independently and proficiently.					

Convert to a cyber:bot

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
• Jumper • Servos • Port	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.			*Practices* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P5. Creating Computational Artifacts. 2 *Create a computational artifact for practical intent, personal expression, or to address a societal issue.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* *Concepts* To 12. Computing Systems: Devices *Computing devices are often integrated with other systems, including biological, mechanical, and social systems. These devices can share data with one another. The usability, dependability, security, and accessibility of these devices, and the systems they are integrated with, are important considerations in their design as they evolve.* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.*	(CRP) Career Ready Practices 2. Apply appropriate academic skills 11. Use technology to enhance productivity (ST) Stem Careers 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 3. Apply processes and concepts for the use of technological tools in STEM. (IT-PRG) Programming & Software Dev. 6. Program a computer application using the appropriate programming language.	Technology Use

	CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results					

	based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*. CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.					

MAIN LESSON(S)

Build Your cyber:bot

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
• 3 position switch • Breadboard • Chassis • cyber:bot • Input/Output pins (I/O) • Jumper • micro:bit • Microcontroller • Multicore • Servo	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word			*Practices* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P5. Creating Computational Artifacts. 3 *Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* *Concepts* To 12. Computing Systems: Devices	(CRP) Career Ready Practices 2. Apply appropriate academic skills 11. Use technology to enhance productivity (ST) Stem Careers 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 3. Apply processes and concepts for the use of technological tools in STEM. (IT-PRG) Programming & Software Dev.	Technology Use Design-thinking

	choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text			*Computing devices are often integrated with other systems, including biological, mechanical, and social systems. These devices can share data with one another. The usability, dependability, security, and accessibility of these devices, and the systems they are integrated with, are important considerations in their design as they evolve.* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.* To 12. Computing Systems: Troubleshooting *Troubleshooting complex problems involves the use of multiple sources when researching, evaluating, and implementing potential solutions. Troubleshooting also relies on experience, such as when people recognize that a problem is similar to one they have seen before or adapt solutions that have worked in the past.*	6. Program a computer application using the appropriate programming language.	

	into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*. CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.					

Navigation with the cyber:bot

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
• Centering • Potentiometer	CCSS.ELA-LITERACY.CCRA.R.1	CCSS.MATH.PRACTICE.MP2	HS-PS3-3.	*Practices* P4: Developing and Using Abstractions. 1	(CRP) Career Ready Practices	Self-direction Technology Use

• Scripts	Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and	Reason abstractly and quantitatively. CCSS.MATH.PRACTICE.MP4 Model with mathematics. CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically. CCSS.MATH.PRACTICE.MP6 Attend to precision. CCSS.MATH.CONTENT.HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. CCSS.MATH.CONTENT.HSG.MG.A.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	*Extract common features from a set of interrelated processes or complex phenomena.* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P4. Developing and Using Abstractions. 3 *Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.* P5. Creating Computational Artifacts. 1 *Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.* P5. Creating Computational Artifacts. 2 *Create a computational artifact for practical intent, personal expression, or to address a societal issue.* P5. Creating Computational Artifacts. 3 *Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 1 *Systematically test computational artifacts by considering all scenarios and using test cases.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* P6. Testing and Refining Computational Artifacts. 3 *Evaluate and refine a computational artifact multiple times to enhance its performance, usability, and accessibility.* P7. Communicating About Computing. 2 *Describe, justify, and document computational processes and solutions using appropriate terminology consistent with the intended audience and purpose.* *Concepts* To 12. Computing Systems: Devices	2. Apply appropriate academic skills 11. Use technology to enhance productivity (ST) Stem Careers 2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 3. Apply processes and concepts for the use of technological tools in STEM. (IT-PRG) Programming & Software Dev. 6. Program a computer application using the appropriate programming language.	Critical-thinking Reflection Revision Design-thinking

	phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*. CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of			*Computing devices are often integrated with other systems, including biological, mechanical, and social systems. These devices can share data with one another. The usability, dependability, security, and accessibility of these devices, and the systems they are integrated with, are important considerations in their design as they evolve.* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.* To 12. Computing Systems: Troubleshooting *Troubleshooting complex problems involves the use of multiple sources when researching, evaluating, and implementing potential solutions. Troubleshooting also relies on experience, such as when people recognize that a problem is similar to one they have seen before or adapt solutions that have worked in the past.* To 12. Algorithms and Programming: Algorithms *People evaluate and select algorithms based on performance, reusability, and ease of implementation. Knowledge of common algorithms improves how people develop software, secure data, and store information.* To 12. Algorithms and Programming: Control *Programmers consider tradeoffs related to implementations, readability, and program performance when selecting and combining control structures.* To 12. Impacts of Computing: Modularity *Complex programs are designed as systems of interacting modules, each with a specific role, coordinating for a common overall purpose. These procedures; or independent,*		

	information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.			*but interrelated, programs. Modules allow for better management of complex tasks.*		

Sound for the cyber:bot

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
• Array • Frequency • Function • Index • List • Parameter • Piezospeaker • Schematic symbol	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10		HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.	*Practices* P4: Developing and Using Abstractions. 1 *Extract common features from a set of interrelated processes or complex phenomena.* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P4. Developing and Using Abstractions. 3 *Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.* P5. Creating Computational Artifacts. 1 *Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.* P5. Creating Computational Artifacts. 2 *Create a computational artifact for practical intent, personal expression, or to address a societal issue.* P5. Creating Computational Artifacts. 3	(CRP) Career Ready Practices 2. Apply appropriate academic skills 6. Demonstrate creativity and innovation 11. Use technology to enhance productivity (ST) Stem Careers 2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 3. Apply processes and concepts for the use of technological tools in STEM. 5. Apply the elements of the design process. (IT-PRG) Programming & Software Dev. 6. Program a computer application using the	Self-direction Technology Use Innovation Critical-thinking Communication Reflection Revision Design-thinking

	Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the			*Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 1 *Systematically test computational artifacts by considering all scenarios and using test cases.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* P6. Testing and Refining Computational Artifacts. 3 *Evaluate and refine a computational artifact multiple times to enhance its performance, usability, and accessibility.* P7. Communicating About Computing. 2 *Describe, justify, and document computational processes and solutions using appropriate terminology consistent with the intended audience and purpose.* *Concepts* To 12. Computing Systems: Devices *Computing devices are often integrated with other systems, including biological, mechanical, and social systems. These devices can share data with one another. The usability, dependability, security, and accessibility of these devices, and the systems they are integrated with, are important considerations in their design as they evolve.* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.* To 12. Computing Systems: Troubleshooting *Troubleshooting complex problems involves the use of multiple sources when*	appropriate programming language.	

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Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
• Active-low • Active-high • Anode • Cathode • Circuit • Diode • Jumper wire • LED • Ohms • Prototyping • Pushbutton • Pull-down resistor • Pull-up resistor • Resistor • Socket	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks,			*Practices* P4: Developing and Using Abstractions. 1 *Extract common features from a set of interrelated processes or complex phenomena.* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P4. Developing and Using Abstractions. 3 *Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.* P5. Creating Computational Artifacts. 1 *Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.* P5. Creating Computational Artifacts. 2 *Create a computational artifact for practical intent, personal expression, or to address a societal issue.* P5. Creating Computational Artifacts. 3 *Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 1 *Systematically test computational artifacts by considering all scenarios and using test cases.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* P6. Testing and Refining Computational Artifacts. 3 *Evaluate and refine a computational artifact multiple times to enhance its performance, usability, and accessibility.* P7. Communicating About Computing. 2	(CRP) Career Ready Practices 2. Apply appropriate academic skills 11. Use technology to enhance productivity (ST) Stem Careers 2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 1. Use STEM concepts and processes to solve problems involving design and/or production. 3. Apply processes and concepts for the use of technological tools in STEM. 5. Apply the elements of the design process. 6. Apply the knowledge learned in STEM to solve problems. (ST-SM) Science & Math 2. Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems. (IT-PRG) Programming & Software Dev. 6. Program a computer application using the appropriate programming language.	Self-direction Technology Use Innovation Critical-thinking Reflection Revision Design-thinking

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Touch Navigation for the cyber:bot

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• Autonomous • Boolean • Initialization • Normally open • Momentary • Nested • Sketch • Single-pole • Single-throw • Tactile switches	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts			*Practices* P3. Recognizing and Defining Computational Problems. 1 *Identify complex, interdisciplinary, real-world problems that can be solved computationally.* P3. Recognizing and Defining Computational Problems. 2 *Decompose complex real-world problems into manageable subproblems that could integrate existing solutions or procedures.* P3. Recognizing and Defining Computational Problems. 3 *Evaluate whether it is feasible to solve a problem computationally.* P4: Developing and Using Abstractions. 1 *Extract common features from a set of interrelated processes or complex phenomena.* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P4. Developing and Using Abstractions. 3 *Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.* P5. Creating Computational Artifacts. 1	(CRP) Career Ready Practices 2. Apply appropriate academic skills 6. Demonstrate creativity and innovation 7. Employ valid and reliable research strategies 8. Utilize critical thinking to make sense of problems and persevere in solving them. 11. Use technology to enhance productivity (ST) Stem Careers 2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 1. Use STEM concepts and processes to solve problems involving design and/or production. 3. Apply processes and concepts for the use of technological tools in STEM.	Self-direction Technology Use Innovation Critical-thinking Reflection Revision Design-thinking

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Visible Light Navigation for the cyber:bot

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
• Phototransistor • Terminal (base, emitter, collector) • Nanometer • Voltage • Ambient light • Analog to digital conversion (A/D) • Sensor (binary, analog, digital) • Digitized (quantized) measurement • Series • Parallel • Ohm's Law • Capacitor • Farad • Current valve • Charge transfer (QT) • Decay • Normalized differential measurement • Zero-justified normalized diff. measurement	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science	CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them. CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively. CCSS.MATH.PRACTICE.MP4 Model with mathematics. CCSS.MATH.PRACTICE.MP6 Attend to precision. CCSS.MATH.CONTENT.HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of the multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. CCSS.MATH.CONTENT.HSN.Q.A.2	HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.	*Practices* P3. Recognizing and Defining Computational Problems. 1 *Identify complex, interdisciplinary, real-world problems that can be solved computationally.* P3. Recognizing and Defining Computational Problems. 2 *Decompose complex real-world problems into manageable subproblems that could integrate existing solutions or procedures.* P3. Recognizing and Defining Computational Problems. 3 *Evaluate whether it is feasible to solve a problem computationally.* P4: Developing and Using Abstractions. 1 *Extract common features from a set of interrelated processes or complex phenomena.* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P4. Developing and Using Abstractions. 3 *Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.* P5. Creating Computational Artifacts. 1 *Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.*	(CRP) Career Ready Practices 2. Apply appropriate academic skills 6. Demonstrate creativity and innovation 7. Employ valid and reliable research strategies 8. Utilize critical thinking to make sense of problems and persevere in solving them. 11. Use technology to enhance productivity. (ST) Stem Careers 2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 1. Use STEM concepts and processes to solve problems involving design and/or production. 3. Apply processes and concepts for the use of technological tools in STEM. 4. Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.	Self-direction Technology Use Innovation Critical-thinking Reflection Revision Design-thinking

	and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or	Define appropriate quantities for the purpose of descriptive modeling. CCSS.MATH.CONTENT.HSN.Q.A.3 Choose a level of accuracy appropriate to the limitations on measurement when reporting quantities. CCSS.MATH.CONTENT.HSA.SSE.A.1 Interpret expressions that represent a quantity in terms of its context. CCSS.MATH.CONTENT.HSA.SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. CCSS.MATH.CONTENT.HSA.REI.A.1 Explain each step in solving a simple equation as following from and equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. CCSS.MATH.CONTENT.HSA.REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing		P5. Creating Computational Artifacts. 2 *Create a computational artifact for practical intent, personal expression, or to address a societal issue.* P5. Creating Computational Artifacts. 3 *Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 1 *Systematically test computational artifacts by considering all scenarios and using test cases.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* P6. Testing and Refining Computational Artifacts. 3 *Evaluate and refine a computational artifact multiple times to enhance its performance, usability, and accessibility.* P7. Communicating About Computing. 2 *Describe, justify, and document computational processes and solutions using appropriate terminology consistent with the intended audience and purpose.* *Concepts* To 12. Computing Systems: Devices *Computing devices are often integrated with other systems, including biological, mechanical, and social systems. These devices can share data with one another. The usability, dependability, security, and accessibility of these devices, and the systems they are integrated with, are important considerations in their design as they evolve.* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.* To 12. Computing Systems: Troubleshooting	5. Apply the elements of the design process. 6. Apply the knowledge learned in STEM to solve problems. (ST-SM) Science & Math 1. Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities. 2. Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems. (IT-PRG) Programming & Software Dev. 6. Program a computer application using the appropriate programming language.	

	performing technical tasks; analyze the specific results based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*. CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.	how extraneous solutions may arise. CCSS.MATH.CONTENT.HSA.REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.		*Troubleshooting complex problems involves the use of multiple sources when researching, evaluating, and implementing potential solutions. Troubleshooting also relies on experience, such as when people recognize that a problem is similar to one they have seen before or adapt solutions that have worked in the past.* To 12. Algorithms and Programming: Algorithms *People evaluate and select algorithms based on performance, reusability, and ease of implementation. Knowledge of common algorithms improves how people develop software, secure data, and store information.* To 12. Algorithms and Programming: Variables *Data structures are used to manage program complexity. Programmers choose data structures based on functionality, storage, and performance tradeoffs.* To 12. Algorithms and Programming: Control *Programmers consider tradeoffs related to implementations, readability, and program performance when selecting and combining control structures.* To 12. Impacts of Computing: Modularity *Complex programs are designed as systems of interacting modules, each with a specific role, coordinating for a common overall purpose. These procedures; or independent, but interrelated, programs. Modules allow for better management of complex tasks.*		

Infrared Light Navigation for the cyber:bot

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
• Infrared • Infrared LED • Infrared receiver	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences	CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.	HS-PS3-3. Design, build, and refine a device that works within given	*Practices* P3. Recognizing and Defining Computational Problems. 1	(CRP) Career Ready Practices 2. Apply appropriate academic skills	Self-direction Technology Use Innovation Critical-thinking

• Subsystem testing • Interference	from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical		constraints to convert one form of energy into another form of energy. HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.	*Identify complex, interdisciplinary, real-world problems that can be solved computationally.* P3. Recognizing and Defining Computational Problems. 2 *Decompose complex real-world problems into manageable subproblems that could integrate existing solutions or procedures.* P3. Recognizing and Defining Computational Problems. 3 *Evaluate whether it is feasible to solve a problem computationally.* P4: Developing and Using Abstractions. 1 *Extract common features from a set of interrelated processes or complex phenomena.* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P4. Developing and Using Abstractions. 3 *Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.* P5. Creating Computational Artifacts. 1 *Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.* P5. Creating Computational Artifacts. 2 *Create a computational artifact for practical intent, personal expression, or to address a societal issue.* P5. Creating Computational Artifacts. 3 *Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 1 *Systematically test computational artifacts by considering all scenarios and using test cases.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.*	6. Demonstrate creativity and innovation 7. Employ valid and reliable research strategies 8. Utilize critical thinking to make sense of problems and persevere in solving them. 11. Use technology to enhance productivity. (ST) Stem Careers 2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 1. Use STEM concepts and processes to solve problems involving design and/or production. 3. Apply processes and concepts for the use of technological tools in STEM. 4. Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner. 5. Apply the elements of the design process. 6. Apply the knowledge learned in STEM to solve problems. (ST-SM) Science & Math 1. Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities. 2. Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.	Reflection Revision Design-thinking

	context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*. CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media			P6. Testing and Refining Computational Artifacts. 3 *Evaluate and refine a computational artifact multiple times to enhance its performance, usability, and accessibility.* P7. Communicating About Computing. 2 *Describe, justify, and document computational processes and solutions using appropriate terminology consistent with the intended audience and purpose.* *Concepts* To 12. Computing Systems: Devices *Computing devices are often integrated with other systems, including biological, mechanical, and social systems. These devices can share data with one another. The usability, dependability, security, and accessibility of these devices, and the systems they are integrated with, are important considerations in their design as they evolve.* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.* To 12. Computing Systems: Troubleshooting *Troubleshooting complex problems involves the use of multiple sources when researching, evaluating, and implementing potential solutions. Troubleshooting also relies on experience, such as when people recognize that a problem is similar to one they have seen before or adapt solutions that have worked in the past.* To 12. Algorithms and Programming: Algorithms *People evaluate and select algorithms based on performance, reusability, and ease of implementation. Knowledge of common*	(IT-PRG) Programming & Software Dev. 6. Program a computer application using the appropriate programming language.	

	(e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.			*algorithms improves how people develop software, secure data, and store information.* To 12. Algorithms and Programming: Variables *Data structures are used to manage program complexity. Programmers choose data structures based on functionality, storage, and performance tradeoffs.* To 12. Algorithms and Programming: Control *Programmers consider tradeoffs related to implementations, readability, and program performance when selecting and combining control structures.* To 12. Impacts of Computing: Modularity *Complex programs are designed as systems of interacting modules, each with a specific role, coordinating for a common overall purpose. These procedures; or independent, but interrelated, programs. Modules allow for better management of complex tasks.*		

PROJECTS

QTI Line Follower for the cyber:bot

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
QTI sensor Argument	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining	CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.	HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. HS-PS4-5. Communicate technical information about how some	*Practices* P3. Recognizing and Defining Computational Problems. 1 *Identify complex, interdisciplinary, real-world problems that can be solved computationally.* P3. Recognizing and Defining Computational Problems. 2 *Decompose complex real-world problems into manageable subproblems that could integrate existing solutions or procedures.* P3. Recognizing and Defining Computational Problems. 3	(CRP) Career Ready Practices 2. Apply appropriate academic skills 6. Demonstrate creativity and innovation 7. Employ valid and reliable research strategies 8. Utilize critical thinking to make sense of problems and persevere in solving them. 11. Use technology to enhance productivity. (ST) Stem Careers	Self-direction Technology Use Critical-thinking Reflection Revision Design-thinking

	technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.7		technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.	*Evaluate whether it is feasible to solve a problem computationally.* P4: Developing and Using Abstractions. 1 *Extract common features from a set of interrelated processes or complex phenomena.* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P4. Developing and Using Abstractions. 3 *Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.* P5. Creating Computational Artifacts. 1 *Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.* P5. Creating Computational Artifacts. 2 *Create a computational artifact for practical intent, personal expression, or to address a societal issue.* P5. Creating Computational Artifacts. 3 *Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 1 *Systematically test computational artifacts by considering all scenarios and using test cases.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* P6. Testing and Refining Computational Artifacts. 3 *Evaluate and refine a computational artifact multiple times to enhance its performance, usability, and accessibility.* P7. Communicating About Computing. 2 *Describe, justify, and document computational processes and solutions using appropriate terminology consistent with the intended audience and purpose.*	2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 1. Use STEM concepts and processes to solve problems involving design and/or production. 3. Apply processes and concepts for the use of technological tools in STEM. 4. Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner. 5. Apply the elements of the design process. 6. Apply the knowledge learned in STEM to solve problems. (ST-SM) Science & Math. 2. Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems. (IT-PRG) Programming & Software Dev. 6. Program a computer application using the appropriate programming language.	

	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*. CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity			*Concepts* To 12. Computing Systems: Devices *Computing devices are often integrated with other systems, including biological, mechanical, and social systems. These devices can share data with one another. The usability, dependability, security, and accessibility of these devices, and the systems they are integrated with, are important considerations in their design as they evolve.* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.* To 12. Computing Systems: Troubleshooting *Troubleshooting complex problems involves the use of multiple sources when researching, evaluating, and implementing potential solutions. Troubleshooting also relies on experience, such as when people recognize that a problem is similar to one they have seen before or adapt solutions that have worked in the past.* To 12. Algorithms and Programming: Algorithms *People evaluate and select algorithms based on performance, reusability, and ease of implementation. Knowledge of common algorithms improves how people develop software, secure data, and store information.* To 12. Algorithms and Programming: Variables *Data structures are used to manage program complexity. Programmers choose data structures based on functionality, storage, and performance tradeoffs.* To 12. Algorithms and Programming: Control		

	band independently and proficiently.			*Programmers consider tradeoffs related to implementations, readability, and program performance when selecting and combining control structures.* To 12. Impacts of Computing: Modularity *Complex programs are designed as systems of interacting modules, each with a specific role, coordinating for a common overall purpose. These procedures; or independent, but interrelated, programs. Modules allow for better management of complex tasks.* To 12. Impacts of Computing: Program Development *Diverse teams can develop programs with a broad impact through careful review and by drawing on the strengths of members in different roles. Design decisions often involve tradeoffs. The development of complex programs is aided by resources such as libraries and tools to edit and manage parts of the program. Systematic analysis is critical for identifying the effects of lingering bugs.*		

Cyber:bot Roaming with the Ping)))

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
Ping))) ultrasonic sensor Speed of sound Sub-system	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and	CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively. CCSS.MATH.PRACTICE.MP4 Model with mathematics. CCSS.MATH.PRACTICE.MP6 Attend to precision. CCSS.MATH.CONTENT.HSN.Q.A.1	HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. HS-PS4-1. Use mathematical representations to support a claim regarding relationships	*Practices* P3. Recognizing and Defining Computational Problems. 1 *Identify complex, interdisciplinary, real-world problems that can be solved computationally.* P3. Recognizing and Defining Computational Problems. 2 *Decompose complex real-world problems into manageable subproblems that could integrate existing solutions or procedures.* P3. Recognizing and Defining Computational Problems. 3	(CRP) Career Ready Practices 2. Apply appropriate academic skills 6. Demonstrate creativity and innovation 7. Employ valid and reliable research strategies 8. Utilize critical thinking to make sense of problems and persevere in solving them. 11. Use technology to enhance productivity. (ST) Stem Careers	Self-direction Technology Use Critical-thinking Reflection Revision Design-thinking Innovation

	figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently. CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*. CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*). CCSS.ELA-LITERACY.RST.9-10.7	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	among the frequency, wavelength, and speed of waves traveling in various media. HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.	*Evaluate whether it is feasible to solve a problem computationally.* P4: Developing and Using Abstractions. 1 *Extract common features from a set of interrelated processes or complex phenomena.* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P4. Developing and Using Abstractions. 3 *Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.* P5. Creating Computational Artifacts. 1 *Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.* P5. Creating Computational Artifacts. 2 *Create a computational artifact for practical intent, personal expression, or to address a societal issue.* P5. Creating Computational Artifacts. 3 *Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 1 *Systematically test computational artifacts by considering all scenarios and using test cases.* P6. Testing and Refining Computational Artifacts. 2 *Identify and fix errors using a systematic process.* P6. Testing and Refining Computational Artifacts. 3 *Evaluate and refine a computational artifact multiple times to enhance its performance, usability, and accessibility.* P7. Communicating About Computing. 2 *Describe, justify, and document computational processes and solutions using appropriate terminology consistent with the intended audience and purpose.*	2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 1. Use STEM concepts and processes to solve problems involving design and/or production. 2. Display and communicate STEM information. 3. Apply processes and concepts for the use of technological tools in STEM. 4. Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner. 5. Apply the elements of the design process. 6. Apply the knowledge learned in STEM to solve problems. (ST-SM) Science & Math 1. Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities. 2. Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems. (IT-PRG) Programming & Software Dev. 6. Program a computer application using the appropriate programming language.	

	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*. CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity			*Concepts* To 12. Computing Systems: Devices *Computing devices are often integrated with other systems, including biological, mechanical, and social systems. These devices can share data with one another. The usability, dependability, security, and accessibility of these devices, and the systems they are integrated with, are important considerations in their design as they evolve.* To 12. Computing Systems: Hardware and Software *Levels of interaction exist between the hardware, software, and user of a computing system. The most common levels of software that a user interacts with include system software and applications. System software controls the flow of information between hardware components used for input, output, storage, and processing.* To 12. Computing Systems: Troubleshooting *Troubleshooting complex problems involves the use of multiple sources when researching, evaluating, and implementing potential solutions. Troubleshooting also relies on experience, such as when people recognize that a problem is similar to one they have seen before or adapt solutions that have worked in the past.* To 12. Algorithms and Programming: Algorithms *People evaluate and select algorithms based on performance, reusability, and ease of implementation. Knowledge of common algorithms improves how people develop software, secure data, and store information.* To 12. Algorithms and Programming: Variables *Data structures are used to manage program complexity. Programmers choose data structures based on functionality, storage, and performance tradeoffs.* To 12. Algorithms and Programming: Control		

	band independently and proficiently.			*Programmers consider tradeoffs related to implementations, readability, and program performance when selecting and combining control structures.* To 12. Impacts of Computing: Modularity *Complex programs are designed as systems of interacting modules, each with a specific role, coordinating for a common overall purpose. These procedures; or independent, but interrelated, programs. Modules allow for better management of complex tasks.* To 12. Impacts of Computing: Program Development *Diverse teams can develop programs with a broad impact through careful review and by drawing on the strengths of members in different roles. Design decisions often involve tradeoffs. The development of complex programs is aided by resources such as libraries and tools to edit and manage parts of the program. Systematic analysis is critical for identifying the effects of lingering bugs.*		

Control Your cyber:bot with an Infrared TV Remote

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
Syntax error	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and	CCSS.MATH.PRACTICE.MP6 Attend to precision.	HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. HS-PS4-1. Use mathematical representations to support a claim regarding relationships	*Practices* P3. Recognizing and Defining Computational Problems. 1 *Identify complex, interdisciplinary, real-world problems that can be solved computationally.* P3. Recognizing and Defining Computational Problems. 2 *Decompose complex real-world problems into manageable subproblems that could integrate existing solutions or procedures.* P3. Recognizing and Defining Computational Problems. 3	(CRP) Career Ready Practices 2. Apply appropriate academic skills 6. Demonstrate creativity and innovation 7. Employ valid and reliable research strategies 8. Utilize critical thinking to make sense of problems and persevere in solving them. 11. Use technology to enhance productivity. (ST) Stem Careers	Self-direction Technology Use Critical-thinking Reflection Revision Design-thinking

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1. K-12 Computer Science Framework. https://k12cs.org/
2. Common Core State Standards Initiative. (2019). www.corestandards.org
3. Advance CTE: State Leaders Connecting Learning to Work. (2019). https://careertech.org
4. Next Generation Science Standards. https://www.nextgenscience.org/