Integrated Computer Science Curriculum

Grade 5

Virginia K-12 Computer Science Pipeline

Loudoun County Public Schools

2021

 Back to Top

Computer Science Leadership Team

LCPS CS Integrated Curriculum Writers

- Jill Buss
- Shawn DeLuca
- Becca Gratz
- Pat Herr
- Susan Journell
- Kathy Nekic
- Abby Spessard
- Amy Stelly

LCPS Curriculum Reviewers

Dr. Scott Ziegler
Superintendent

Dr. Ashley Ellis
Deputy Superintendent, Instruction

Neil Slevin
Executive Director, Teaching and Learning

Nick Grzeda
Supervisor, Computer Science

This document, based on the Virginia Department of Education's Computer Science Standards of Learning and Curriculum Framework (2017) provides extensions and additions to form the Integrated Computer Science curriculum.

 Back to Top

The Loudoun County Public Schools Computer Science Office

The LCPS CS Office works to prepare all learners with essential Computational Thinking and Computer Science skills by facilitating meaningful, content-integrated learning experiences that support the LCPS Profile of a Graduate and the Culturally Responsive Framework.

Our vision is to *Fuel Integration; Spark Inspiration; and Ignite Innovation*. The logo of the Computer Science Office displays this vision - there are three flames surrounded by French Brackets, often associated with text based programming. Each flame is a different color and is represented with a corresponding attribute - the orange flame is the ***fuel*** that supports teachers in integrating CS into the core curriculum; the red flame represents the ***spark*** of inspiration that our coaches provide teachers; and the blue flame finalizes the three step process in working with teachers, ***igniting*** their passion for their students to innovate in the classroom.

For each of the six strands of the Computer Science Standards of Learning, *Computing Systems, Networks and the Internet, Cybersecurity, Data and Analysis, Algorithms and Programming, and Impacts of Computing*, these concepts are provided - the fuel is provided to build teacher capacity in understanding the SOL, the spark provides a connection for Computer Science to be integrated within the curriculum, whereas the ignite is where teachers will share out authentic learning experiences and lessons in our repository of lessons found in the GoOpenVA Collection, *Virginia K-12 Computer Science Pipeline*.

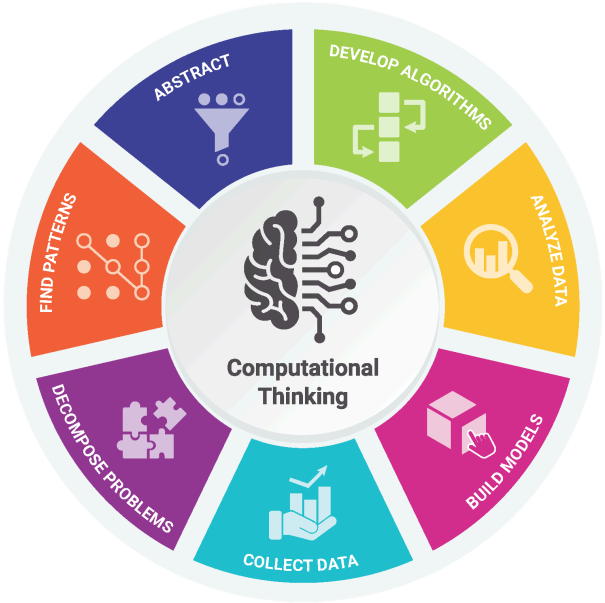
Ideas for Integrations - Categories

Fuel	Spark	Ignite
To fuel the interests of our students. Fuel is designed to introduce Computer Science and Computational Thinking concepts to support the integration process.	*To spark educators to integrate Computer Science into grade level content.* Spark is designed to support content with Computer Science and Computational Thinking concepts and inspire authentic learning experiences.	*To ignite students' creative spirit of design.* Ignite facilitates a students' application of deeper learning by allowing them to be innovative in their thinking and design.

 Back to Top

Computational Thinking

As the VDOE Computer Science Standards of Learning states, *Computational Thinking* is an approach to solving problems in a way that can be implemented with a computer. The LCPS Computer Science Office has collaborated with the *Ignite My Future* (created out of partnership with TATA Consultancy Services and Discovery Education) team who has provided professional learning experiences for teachers in LCPS on multiple occasions throughout the past few years. Ignite My Future composed their model for computational thinking by establishing seven components. LCPS has adopted this model (with Ignite My Future's permission) and had the following iconography crafted for each component as seen in the table below. While the connection between Computational Thinking and Computer Science exists, this curriculum is focused on connecting the Standards of Learning from the Virginia 3rd Grade Curriculum and the Computer Science standards.



 Back to Top

Seven Components of Computational Thinking

	**What is ABSTRACTION?** Abstraction is the process of filtering out (ignoring) the characteristics we don't need or focusing on only the characteristics which "matter."
	**What is DEVELOPING ALGORITHMS?** Developing algorithms is the process that creates solutions using step-by-step instructions that operate like a road map for performing a task.
	**What is ANALYZING DATA?** Analyzing data is the process of breaking down complex problems by evaluating data using appropriate statistical methods to test a hypothesis.
	**What is BUILDING MODELS?** Building models is the process of testing, tweaking, and refining an object or process before creating it in real life using physical models or design software to predict outcomes.
	**What is COLLECTING DATA?** • Collecting data is the process of gathering and measuring information, in an established systematic fashion. • Collecting data is the process of collecting insights for research using standard validated techniques. • In Computational Thinking, collecting data is the process of using qualitative and quantitative resources to gather information pertaining to a topic.
	**What is DECOMPOSITION?** Decomposition is the process of taking a larger problem and breaking it down into smaller and more manageable steps.
	**What is FINDING PATTERNS?** Finding patterns is the process of looking for similarities in information in order to solve a problem, create rules, and make predictions about future trends.

 Back to Top

Core Standards at a Glance

Language Arts	Math	Science	Social Science	Health	Physical Education	Music	Fine Arts
5.1h **5.3c** **5.5k (2)** **5.7** **5.7c** **5.8** **5.9d,f**	**5.2** **5.6** **5.7 (2)** **5.16a,b,c** **5.18 (2)** **5.19a,c** **5.19b,d (2)**	**5.1b (2)** **5.1c,d** **5.4**		**5.1p** **5.1q (2)** **5.3** **5.3m,p**	**5.2a** **5.3**	**5.5b** **5.8** **5.13** **5.15**	**5.2a** **5.8**

In addition to unpacking the Standards of Learning for Language Arts, Math, Science, and Social Science, the LCPS Computer Science Office has begun integrating the Computer Science Standards of Learning into the other subjects in the curriculum. Health, Physical Education, Music, and Fine Arts has been included in this curriculum document.

The unpacked standards that correlate with Computer Science are listed in the *Standards at a Glance* table above. You can see the connections between these and Computer Science Standards of Learning by referencing the *Content Integration by CS Standard* table below.

 Back to Top

Content Integration by CS Standard

CS Standard	Content Integration	Content Integration	Content Integration
5.1 - Algorithms	English 5.7 - Writing Process	Math 5.19b - Equations with Variables	Music 5.15 - Rhythmic Patterns
5.2 - Block Based Programming	Math 5.18 - Patterns	Math 5.19d - Creating Problem Situations	
5.3 - Analyzing Algorithms	English 5.5k - Cause and Effect	Math 5.7 - Order of Operations	
5.4 - Iterative Design Process	English 5.7 - Writing in a Variety of Forms	Science 5.1b - Investigations	Fine Arts 5.2a - Creative Art Process
5.5 - Decomposing Problems	English 5.1h - Oral Communication	Math 5.7 - Order of Operations	Music 5.5b - Collaborate on Musical Presentation Music - 5.13 - Skills for Singing Performance
5.6 - Giving Credit to work	English 5.9d - Giving Credit	Fine Arts 5.8 - Intellectual Property	Music 5.8 - Intellectual Property
5.7 - Input and Output	Math 5.18 - Number Patterns	Physical Education 5.2a - Body Systems	
5.8 - Troubleshooting	*Stand alone lesson coming*		
5.9 - Appropriate Use	English 5.5k - Cause and Effect	English - 5.9 Research	Health - 5.1q Violence Prevention
5.10 - Strong Passwords	Common Sense Media		
5.11 - Analyzing Data	Math 5.16a,b,c - Probability & Statistics	Science 5.1b,c,d - Engineering Process	Physical Education 5.3 - Fitness Planning
5.12 - Creating a Model	Math 5.2a - Number & Number Sense Math 5.6b - Computation & Estimation	Science 5.4 - Force, Motion & Energy	Health - 5.3 Advocacy & Health Promotion
5.13 - Numeric Values	Math 5.19a,b,c,d - Variables		
5.14 - Technology Influences	*Stand alone lesson coming*		
5.15 - Influences of Computers	Health 5.1q - Essential Health Concepts	Health 5.3m - Influence on Self image	
5.16 - Cyberbullying	Health 5.1p - Essential Health	Common Sense Media	

 Back to Top

	Concepts		
5.17 - Electronic Communication	English 5.3 - Communication & Multimodal Literacies		

Algorithms and Programming

Algorithms and Programming involves the use of algorithms. An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems. The development process to create meaningful and efficient programs involves choosing which information to use and how to process and store it, breaking apart large problems into smaller ones, recombining existing solutions, and analyzing different solutions.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.1 The student will construct sets of step-by-step instructions (algorithms) both independently and collaboratively, a. using sequencing; b. using loops; c. using variables to store and process data; d. performing number calculations on variables (addition, subtraction, multiplication and division); and e. using conditionals (if-statements).	❖ Algorithm ❖ Variable ❖ Conditional (if-statement)	❖ Construct algorithms to include loops, variables, and conditionals. ❖ Identify a variable in an algorithm. ❖ Apply the use of variables in a math calculation in an algorithm. ❖ Assign one or more variables in a computer program to name or categorize data. ❖ Apply the use of conditionals in an algorithm.	❖ When should you use an if-statement in an algorithm? ❖ How do we use variables to complete math problems on a computer? ❖ When do you assign a variable to an expression or a set of data? ❖ When you use an if-statement, how does the computer respond to the directions? ❖ Why are if-statements useful when writing algorithms?
Student language: I can build an algorithm that includes sequencing, loops, variables, conditionals (if-then statements), and perform numeric calculations on variables, both by myself and with a friend.			

Subject	VA SOL Strand	VA SOL	Making a Connection
English	Writing	**5.7** The student will write in a variety of forms to include narrative, descriptive, expository, and persuasive	

 Back to Top

Math	Patterns, Functions, and Algebra	**5.19b** The student will write an equation to represent a given mathematical relationship, using a variable	
Music	Technique and Application	**5.15** The student will classify, perform, and count rhythmic patterns	

Fuel	Spark	Ignite
❖ *BrainPOP CS Variables*	❖ *Scratch Calculator (see example)*	❖ Ignite projects will be driven by content and student interest.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.2 The student will construct programs to accomplish a task as a means of creative expression using a block- or text-based programming language, both independently and collaboratively a. using sequencing; b. using loops; c. using variables; d. using mathematical operations (addition, subtraction, multiplication and division) variable to manipulate a variable; and e. using conditionals (if-statements).	❖ Algorithm ❖ Variable ❖ Conditional (if-statement)	❖ Use loops, variables, and conditionals when creating block or text-based programs. ❖ Understand that computing devices can be used as a means for creative expression. ❖ Explain different types of creative products that can be generated using a computing device (e.g. computer games, interactive stories, graphic design, programs, music, and movies). ❖ Determine an original problem and create a solution using a text or block-based program.	❖ When might you use an if-statement in a program that is designed for creative expression? ❖ What are examples of different creative products that you can make using a program?

Student language: I can use block based or text based coding language and design a program that includes sequencing, loops, variables to change other variables, conditionals (if-then statements), and perform numeric calculations on variables, both by myself and with a friend.

Subject	VA SOL Strand	VA SOL	Making a Connection
Math	Patterns, Functions, and Algebra	**5.18** The student will identify, describe, create, express, and extend number patterns found in objects, pictures, numbers and tables.	

 Back to Top

Math	Patterns, Functions, and Algebra	**5.19d** The student will create a problem situation based on a given equation, using a single variable and one operation	

 Fuel	 Spark	 Ignite
❖	❖ *Prime Number Projectile Scratch Project*	❖ Ignite projects will be driven by content and student interest.

VA Computer Science SOL	**Vocabulary**	**Essential Skills**	**Essential Questions**
5.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, loops, conditionals, and variables.	❖ Bug ❖ Debug	❖ Describe how an algorithm didn't work (e.g., character is not moving as intended). ❖ Analyze an algorithm that is flawed and determine possible solution(s). Implement a proposed adjustment to a sequence that did not work as intended. ❖ Explain how a proposed adjustment increases the effectiveness of an algorithm.	❖ If your program does not run, how could you correct it? ❖ If your algorithm is not working as intended, how could you fix it? ❖ Once you have found an error in your algorithm, how do you decide what adjustment needs to be made? ❖ How can the sequence of your steps affect the outcome of a program or algorithm?
Student language: I can analyze, correct, and debug an algorithm that includes sequencing, events, loops, conditionals, and variables.			

Subject	**VA SOL Strand**	**VA SOL**	**Making a Connection**
English	Reading	**5.5k** The student will read and demonstrate comprehension of fictional texts, literary nonfiction, and poetry - Identify cause and effect relationships.	
English	Writing	**5.8** The student will self- and peer-edit writing for capitalization, spelling, punctuation, sentence structure, paragraphing, and Standard English.	

 Back to Top

Math	Computation and Estimation	**5.7** The student will simplify whole number numerical expressions using the order of operations.	

Fuel	Spark	Ignite
❖	❖	❖ Ignite projects will be driven by content and student interest.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.4 The student will create a plan as part of the iterative design process, both independently and collaboratively using strategies such as pair programming (e.g., storyboard, flowchart, pseudo-code, story map).	❖ Planning tool ❖ Storyboard ❖ Pseudocode	❖ Design a program using a planning tool. ❖ Review and revise a plan to better fit the needs of a task. ❖ Communicate how an iterative design process can improve an algorithm.	❖ Why is planning out a story or program an important part of the writing process? ❖ Why is reviewing and revising your work important? ❖ What kinds of jobs require the use of iterative problem solving? ❖ How do people in different careers use the iterative process? ❖ What is the value in making small, targeted, additions or changes to your algorithm rather than large changes?

Student language: I can plan as part of the iterative (design process), both by myself or with a group, using strategies like pair programming.

Subject	VA SOL Strand	VA SOL	Making a Connection
English	Writing	**5.7c** The student will write in a variety of forms to include narrative, descriptive, expository, and persuasive - Use a variety of prewriting strategies.	
Science	Scientific and Engineering Practices	**5.1b** The student will demonstrate an understanding of scientific and engineering practices by planning and carrying out investigations	

 Back to Top

Fine Arts	Creative Process	**5.2a** The student will apply a creative process for artmaking. Apply steps of the creative process, including brainstorming, researching, preliminary sketching, planning, reflecting, and refining, to synthesize ideas for and create works of art.	

Fuel	Spark	Ignite
❖	❖ *Lego Spike Essentials Kit -Carnival Games to support Force and Motion* ❖ *Animal Research-Students create a poster with facts they've learned. Then they build a robot designed to look like a sea animal using Lego Spike and code the robot to visit the facts around the poster.*	❖ Ignite projects will be driven by content and student interest.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.5 The student will break down (decompose) a larger problem into smaller sub-problems, both independently and collaboratively.	❖ Decompose	❖ Analyze and decompose a problem into subproblems. ❖ Explain why multiple smaller problems may be easier to solve than one large problem.	❖ Why does breaking a problem down into smaller subproblems make the overall task easier? ❖ How does decomposing a program into subproblems help programmers when debugging a program? ❖ Why would using subproblems in a program be thought of as a time-saving measure?
Student language: I can decompose (break down) a large problem into smaller sub-problems, both by myself and with a friend.			

Subject	VA SOL Strand	VA SOL	Making a Connection
English	Oral Language	**5.1h** The student will use effective oral communication skills in a variety of settings. Work respectfully with others and show value for individual contributions.	

 Back to Top

Math	Computation and Estimation	**5.7** The student will simplify whole number numerical expressions using the order of operations.	
Music	Critical Thinking and Communication Technique and Application	**5.5b** Collaborate with others to create a musical presentation and acknowledge individual contributions as an integral part of the whole. **5.13** The student will develop skills for individual and ensemble singing performance.	

 Fuel	 Spark	 Ignite
❖	❖	❖ Ignite projects will be driven by content and student interest.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.6 The student will give credit to sources when borrowing or changing ideas (e.g., using information, pictures created by others, using music created by others, remixing programming projects).	❖ Author ❖ Illustrator ❖ Composer ❖ Source	❖ Review a program they created and identify portions that may have been created by others. ❖ Explain why it is important to give credit to authors. ❖ Describe when it is acceptable to use people's work, and how to give credit to sources. ❖ Recognize that different artifacts, including online, programs, and physical (i.e., books, paintings, webpages) have creators.	❖ How can you find the creator of an artifact? ❖ What are examples of artifacts that need to need to have their creators credited? ❖ Why is important to give credit for using someone else's idea, even if you aren't quoting them directly? ❖ If you use a portion of someone else's algorithm, why do you need to give credit?
Student language: I can give credit to the original creator or source when borrowing or changing ideas (pictures, music, programs, etc.)			
Subject	**VA SOL Strand**	**VA SOL**	**Making a Connection**
English	Research	**5.9d** Give credit to sources used in research.	

 Back to Top

Fine Arts	History, Culture, and Citizenship	**5.8** The student will define intellectual property as it relates to art.	
Music	History, Culture, and Citizenship	**5.8** The student will define intellectual property as it relates to music and the music industry.	

 Fuel	 Spark	 Ignite
❖	❖	❖ Ignite projects will be driven by content and student interest.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.7 The student will model how a computing system works including input and output, processors, sensors and storage.	❖ Input ❖ Output ❖ Processor ❖ Sensor ❖ Storage	❖ Describe how a computing system may use different components to receive input including sensors. Identify the processor as the component which manipulates input into output. ❖ Describe how a computing system may produce output. ❖ Model a simple computing system indicating inputs and outputs. ❖ Explain how data can be stored in a computer for later use. ❖ Recognize that different types of data require different amounts of storage.	❖ What are examples of sensors or computer components that take in input? ❖ What kind of input can a computer take in? ❖ What are the different types of output that a computer can produce? ❖ What is storage in regards to a computing device? ❖ How does the amount of storage affect how well a computer functions? ❖ How do storage requirements differ between different media?
Student language: I can model how a computing system works.			

Subject	VA SOL Strand	VA SOL	Making a Connection
Math	Patterns, Functions, and Algebra	**5.18** The student will identify, describe, create, express, and extend number patterns found in objects, pictures, numbers, and tables	

 Back to Top

Physical Education	Anatomical Basis of Movement	**5.2a** Identify components of major body systems, to include cardiorespiratory, vascular, muscular, and skeletal.	

 Fuel	 Spark	 Ignite
❖	❖	❖ Ignite projects will be driven by content and student interest.

Computing Systems

Computing Systems involves the interaction that people have with a wide variety of computing devices that collect, store, analyze, and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form. An understanding of hardware and software is useful when troubleshooting a computing system that does not work as intended.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.8 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use, and apply strategies for solving problems (e.g., rebooting the device, checking for power, checking network availability, closing and reopening an app).	❖ Troubleshoot	❖ Identify when a device or program is not working properly. ❖ Communicate that a device or program is not working. ❖ Perform simple troubleshooting tasks (e.g., rebooting the computer) ❖ Differentiate hardware and software derived problems.	❖ How can you find out specifically why your computer is not working? ❖ What are different troubleshooting tactics you should try if a program is not working? ❖ Why is it important to be as specific as possible when you are describing a problem? ❖ How can you tell whether a problem is related to hardware or software? ❖ What are examples of hardware/software problems?
Student language: I can identify and express problems that occur while using simple hardware and software, and use strategies to help solve them.			
Subject	**VA SOL Strand**	**VA SOL**	**Making a Connection**

 Back to Top

		Stand alone lesson coming	

Fuel	Spark	Ignite
❖	❖	❖ Ignite projects will be driven by content and student interest.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.9 The student will evaluate and solve problems that relate to inappropriate use of computing devices and networks.		❖ Identify and explain causes and effects related to inappropriate use of computing devices. ❖ Identify real-life situations they encounter while using computing devices that could cause problems in school or at home. ❖ Describe how a technology-related problem could be avoided or prevented.	❖ What is appropriate use of technology? ❖ If you see someone using technology inappropriately in school, how should you notify the proper person? ❖ What are some consequences of inappropriate use of computing technology? ❖ What are examples from the news concerning inappropriate use of technology? ❖ If you were designing a system to stop inappropriate use of technology, what would it look like and why?
Student language: I can identify and solve problems resulting in inappropriate use of technology and networks.			
Subject	**VA SOL Strand**	**VA SOL**	**Making a Connection**
English	Reading	**5.5k** Identify cause and effect relationships.	
English	Research	**5.9f** The student will find, evaluate, and select appropriate resources to create a research product f) Demonstrate ethical use of the Internet.	

 Back to Top

Health	Violence Prevention	**5.1q** Recognize the influence of violence in the media on behaviors.	

Fuel	Spark	Ignite
❖ Interland	❖	❖ Ignite projects will be driven by content and student interest.

Cybersecurity

Cybersecurity, also known as information technology security, involves the protection of computers, networks, programs, and data from unauthorized or unintentional access, manipulation, or destruction. Many organizations, such as government, military, corporations, financial institutions, hospitals, and others collect, process, and store significant amounts of data on computing devices. That data is transmitted across multiple networks to other computing devices. The confidential nature of government, financial, and other types of data requires continual monitoring and protection for the sake of continued operation of vital systems and national security.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.10 The student will determine whether passwords are strong, explain why strong passwords should be used, and demonstrate proper use and protection of personal passwords.	❖ Password	❖ Explain how a password helps protect the privacy of information. ❖ Respect other students' password privacy. Explain how logging off devices can protect your information. ❖ Classify passwords as strong or weak. ❖ Create and use strong passwords to be used in school and home.	❖ What are the components of a strong password? ❖ Why should you change your password periodically? ❖ Why should you have a different password for different accounts?
Student language: I can identify a strong password and explain what a strong password is and how to keep it safe.			
Subject	**VA SOL Strand**	**VA SOL**	**Making a Connection**
Common Sense Media	Cyber Security	Password Power Up	

 Back to Top

Fuel	Spark	Ignite
❖ *Digital Passport* - *Password Protect* ❖ *Code.org Lesson* - *Powerful Passwords*	❖	❖ Ignite projects will be driven by content and student interest.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.11 The student will use a computer to observe, analyze, and manipulate data in order to draw conclusions and make predictions.	❖ Data	❖ Use a computer to organize data using various forms (i.e., tables, spreadsheets) of data collection. ❖ Conduct manipulations of data using the computer. ❖ Analyze a data set to identify a pattern or make a prediction. ❖ Use the data or prediction to answer a question. ❖ Display the same data on a computer using multiple representations (e.g., tables, bar graphs, line graphs).	❖ How can you use the data you have collected to make a prediction or answer a question? ❖ How does a computer help you to look at data in different ways? ❖ What can you learn from looking at your data in different formats? ❖ How can computers be used to view data using a variety of formats? ❖ What does a computer allow you to do with data that is more difficult on paper?
Student language: I can answer a question using a computer to find data in order to draw conclusions and make predictions.			

Subject	VA SOL Strand	VA SOL	Making a Connection
Math	Probability & Statistics	The student, given a practical problem, will **5.16a** represent data in line plots and stem-and-leaf plots; **5.16b** interpret data represented in line plots and stem-and-leaf plots; and **5.16c** compare data represented in a line plot with the same data represented in a stem-and-leaf plot.	
Science	Scientific and Engineering Practices	The student will demonstrate an understanding of scientific and engineering practices by **5.1b** planning and carrying out investigations **5.1c** interpreting, analyzing, and evaluating data	

 Back to Top

		5.1d constructing and critiquing conclusions and explanations	
Physical Education	Fitness Planning	**5.3** The student will use personal fitness assessment data to enhance understanding of physical fitness.	

Fuel	Spark	Ignite
❖	❖	❖ Ignite projects will be driven by content and student interest.

Data and Analysis

Data and Analysis involves the data that exist and the computing systems that exist to process that data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.12 The student will create an artifact using computing systems to model the attributes and behaviors associated with a concept (e.g., plate tectonics).	❖ Model	❖ Use a computing system to create an artifact to model a concept. ❖ Describe how a model reflects the attributes or behaviors of a concept.	❖ What are examples of models that we see and use regularly? ❖ What are examples of concepts that you can model? ❖ What kinds of things do you need to know before you begin to make a model? ❖ How does a computer model help us learn and predict things about large, small, and complex systems?
Student language: I can create an artifact using a computer to model attributes and behaviors connected to a learned idea.			
Subject	**VA SOL Strand**	**VA SOL**	**Making a Connection**
Math	Number & Number Sense	**5. 2** The student will represent and identify equivalencies among fractions and decimals, with and without models;	

 Back to Top

		5.6 The student will solve single-step practical problems involving multiplication of a whole number, limited to 12 or less, and a proper fraction, with models.	
Science	Force, Motion, and Energy	**5.4** The student will investigate and understand that electricity is transmitted and used in daily life.	
Health	Advocacy & Health Promotion	**5.3** The student will explain how peers, families, and community groups work together to promote health, prevent disease, and create a healthy community.	

 Fuel	 Spark	 Ignite
	❖ *MaKey MaKey Circuit* ❖ *Snap Circuits*	

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.13 The student will use numeric values to represent non-numeric ideas in the computer (e.g., binary, ASCII, pixel attributes such as RGB).	❖ Binary ❖ Pixel ❖ ASCII	❖ Understand that computers use numeric values to represent nonnumeric ideas. ❖ Give an example of when numeric values can be used to represent nonnumeric ideas. ❖ Apply using numeric values to represent non-numeric ideas to in a real-world example.	❖ What is a numeric value? ❖ What are some examples of how numbers are used to represent nonnumeric ideas in the computer? ❖ Why are numbers used to represent nonnumeric ideas in the computer? ❖ Why does a computer convert input into a different format?
Student language: I can use numbers to represent non-numeric ideas in the computer. (binary, pixel, etc.)			

 Back to Top

Subject	VA SOL Strand	VA SOL	Making a Connection
Math	Patterns, Functions, Algebra	The student will **5.19a** investigate and describe the concept of variable; **5.19b** write an equation to represent a given mathematical relationship, using a variable; **5.19c** use an expression with a variable to represent a given verbal expression involving one operation; and **5.19d** create a problem situation based on a given equation, using a single variable and one operation.	

Fuel	Spark	Ignite
❖ *MakeCode Pixel Pictures*	❖	❖ Ignite projects will be driven by content and student interest.

 Back to Top

Impacts of Computing

Impacts of Computing involves the effect that computing has on daily life. Computing affects many aspects of the world in both positive and negative ways at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions, and in turn, computing influences new cultural practices. An informed and responsible person should understand the social implications of the digital world, including equity and access to computing.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.14 The student will give examples and explain how computer science has changed the world and express how computing technologies influence, and are influenced by, cultural practices.	❖ Internet	❖ Identify computing technologies that have changed the world. ❖ Explain how the technology is influenced by culture. ❖ Explain how the culture can affect the technology. ❖ Brainstorm solutions involving computing technology to solve a problem in your school.	❖ What are examples of computing technologies that changed the world? ❖ How has technology, like mobile phones, changed society? ❖ How does society influence the technology that we invent? ❖ If you could design a new computing technology, what would it do, and why?
Student language: I can give examples and explain how computer science has changed the world, and how technologies influences, and are influenced by, cultures.			

Subject	VA SOL Strand	VA SOL	Making a Connection
		Stand alone lesson coming	

Fuel	Spark	Ignite
❖	❖	❖ Ignite projects will be driven by content and student interest.

 Back to Top

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.15 The student will evaluate and describe the positive and negative impacts of the pervasiveness of computers and computing in daily life (e.g., downloading videos and audio files, electronic appliances, wireless Internet, mobile computing devices, GPS systems, wearable computing).	❖ Internet	❖ Identify how the use of computers and computing positively influences daily life. ❖ Identify how the use of computers and computing negatively influences daily life. ❖ Evaluate use of time in activities at school and at home to determine positive and negative impacts of these activities on health and wellbeing.	❖ How do computing devices make your life easier? ❖ How have computing devices made people's lives more complicated? ❖ What are ways to limit the negative influences of computing devices? ❖ What do you believe are good rules about technology use to make sure that we can use them wisely?
Student language: I can research and explain the impact that computers and computing have on our daily life, both negative and positive effects.			

Subject	VA SOL Strand	VA SOL	Making a Connection
Health	Essential Health Concepts	**5.1q** The student will analyze the impact of positive health behaviors and risky behaviors on personal health q) Recognize the influence of violence in the media on behaviors.	
Health	Advocacy and Health Promotion	**5.3m** The student will explain how peers, families, and community groups work together to promote health, prevent disease, and create a healthy community m) Analyze positive and negative influences on self-image (e.g., media, peers).	

Fuel	Spark	Ignite
❖	❖	❖ Ignite projects will be driven by content and student interest.

 Back to Top

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.16 The student will explain social and ethical issues that relate to computing devices and networks.	❖ Cyberbullying	❖ Describe problems that arise from computer use. ❖ Determine solutions to common computer use issues	❖ What is cyberbullying? ❖ How could computing technology make it easier for people to engage in negative behavior? ❖ What should you do if you see other people using a computer to do harm to others?
Student language: I can explain social and ethical issues that relate to computers and networks.			
Subject	**VA SOL Strand**	**VA SOL**	**Making a Connection**
Common Sense Media	Cyberbullying, Digital Drama, & Hate Speech	Is it Cyberbullying?	
Health	Essential Health Concepts	**5.1p** The student will analyze the impact of positive health behaviors and risky behaviors on personal health. p) Define cyberbullying and its impact on one's health and well-being	
Health	Advocacy and Health Promotion	**5.3p** The student will explain how peers, families, and community groups work together to promote health, prevent disease, and create a healthy community. p) Describe ways to offer friendship and support to someone who has been cyberbullied.	

Fuel	Spark	Ignite
❖	❖	❖ Ignite projects will be driven by content and student interest.

 Back to Top

Networking and the Internet

Networks and the Internet involves the networks that connect computing systems. Computing devices do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world by providing fast, secure communication and facilitating innovation.

VA Computer Science SOL	Vocabulary	Essential Skills	Essential Questions
5.17 The student will compare and contrast the difference between a local network and a worldwide network.	❖ Network ❖ Local network ❖ Worldwide network	❖ Compare and contrast the difference between a local network and a worldwide network. ❖ Model a network at home or school showing different components (i.e. printers, computers, and server).	❖ What is a network? ❖ What is the difference between a local and a worldwide network? ❖ What are examples of local and global networks? ❖ What are the advantages and disadvantages of local and global networks?
Student language: I can compare and contrast local (Intranet) networks and worldwide (Internet) networks.			
Subject	**VA SOL Strand**	**VA SOL**	**Making a Connection**
English	Communication and Multimodal Literacies	**5.3c** The student will learn how media messages are constructed and for what purposes c) Compare and contrast techniques used in a variety of media messages.	

Fuel	Spark	Ignite
❖	❖	❖ Ignite projects will be driven by content and student interest.

 Back to Top