



8.1a Algorithms and Programming

The student will construct programs to accomplish a task as a means of creative expression or scientific exploration using a block-based or text-based programming language, both independently and collaboratively, by combining control structures such as if-statements and loops including nested conditionals and loops;

Curriculum Framework Summary

Programs are collections of code organized in algorithms that can accomplish a variety of tasks. Programs can be developed to perform calculations, manipulate data, or simply to be creative. Programs can involve different control structures such as loops and if-statements; these control structures are blocks of programming that analyze variables within the program code to adjust and use accurate values as they change. Control structures help students develop their problem-solving skills and foster computational thinking. Effective variable use including naming conventions, makes the problem-solving process easier and faster.

Prerequisite Knowledge

Students should have a foundational knowledge of block-based and text-based programming that includes compound conditionals and nested control structures.

Vocabulary

Term	Definition
pseudocode	A process that involves a writing out the steps of a program in English to make sure the flow of control and logic makes sense
loop	A conditional structure that repeats a section of code until a condition is met.
If-else statement	A programming conditional statement that defines two actions to be run dependent on the result of a particular condition
nesting	Organizing control structures such as if-statements or loops within other control structures.

Summary of the Lesson

Students will work in groups to create a [Twine](#) that represents comparing two stories, experiences, objects, or processes. The teacher will give each student a graphic organizer to be used to map out the steps for their interactive program in which the two items are compared. The teacher will also share with each student the basics of Twine text-based coding and review basic coding vocabulary needed such as "loop", "if-else statement", and "nesting". As a group students will need to identify which conditionals are loops, if-then statements, or nesting.

Integration Opportunities

Math 8.MG.3
Given a coordinate plane in the block based coding program Scratch, students will use nested conditionals to create a polygon as well as its translation, reflection, and dilation.

Physical Science 3b
Students will use a block based coding program with nested conditions, if-then statements, and loops to demonstrate the difference between physical and chemical changes in matter.

World Geography.2, 3
Design a program that shows the shifting land occupied by Native Americans during Westward Expansion

Music 8.10
Students will compare and contrast the creation of music using technology with coding that includes if-then statements and loops.

Proficient	Developing	Emerging
Students can explain the concepts of loops, if-else statements and nested conditionals in text-based coding, and how they work in text-based programming.	Students can explain the concepts of loops, if-else statements and nested conditionals in text-based coding, but may struggle with understanding how they work in practice.	The student has difficulty explaining the concepts of loops, if-else statements and nested conditionals in text-based coding, and struggles with understanding how they work in practice.





8.1b Algorithms and Programming

The student will construct programs to accomplish a task as a means of creative expression or scientific exploration using a block-based or text-based programming language, both independently and collaboratively, by using clearly named variables that represent different data types, including numeric and non-numeric data, and perform operations on their values;

Curriculum Framework Summary

Programs are collections of code organized in algorithms that can accomplish a variety of tasks. Programs can be developed to perform calculations, manipulate data, or simply to be creative. Programs can involve different control structures such as loops and if-statements; these control structures are blocks of programming that analyze variables within the program code to adjust and use accurate values as they change. Control structures help students develop their problem solving skills and foster computational thinking. Effective variable use including naming conventions, makes the problem solving process easier and faster.

Prerequisite Knowledge

Students should have a foundational knowledge of block-based and text-based programming that includes compound conditionals and nested control structures.

Vocabulary

Term	Definition
pseudocode	A process that involves a writing out the steps of a program in English to make sure the flow of control and logic makes sense
loop	A conditional structure that repeats a section of code until a condition is met.
If-else statement	A programming conditional statement that defines two actions to be run dependent on the result of a particular condition
nesting	Organizing control structures such as if-statements or loops within other control structures.

Summary of the Lesson

Teacher will review the concepts of potential energy and its relationship with height and mass. Working in pairs or small groups students will need to complete a short tutorial on block-based programming. Student groups are then to create their own program that calculates potential energy. Have students then measure and calculate the potential energy of several objects of different masses and from different distances. Each group needs to record their measurements. Students will share their results and discuss the program they created to calculate potential energy.

Integration Opportunities

Math 8.PS.2
Students will use two sets of test scores to create comparative and interactive box plots via a block-based coding program.

Math 8.PS.3
Students will use data based on healthy height and weight to create an interactive scatterplot via a block-based coding program.

PS.5a
Students will use a block-based coding program to construct models that demonstrate the different amounts of potential energy stored in a system when the arrangement of the objects interacting at a distance changes.

Proficient	Developing	Emerging
Students will create a block-based program that calculates potential energy using appropriate variables, operators, and output statements.	Students will create a block-based program that calculates potential energy using appropriate variables and operators, and output statements.	Students will create a block-based program that calculates potential energy using provided variables and may require guidance with appropriate operators and output statements.



8.1c Algorithms and Programming

The student will construct programs to accomplish a task as a means of creative expression or scientific exploration using a block-based or text-based programming language, both independently and collaboratively, by creating functions with parameters.

CodeVA

Curriculum Framework Summary

When constructing a program, programmers often use the same code more than once. A function allows the programmer to name a section of code, then easily call on it to reuse it later in the code, allowing for a sequence of instructions to be compiled into one command. The parameter is what you are passing into the function (i.e. variables, string). Students will design a program incorporating a function with parameters.

Prerequisite Knowledge

To engage with this standard, students should have experience developing algorithms or following a set of rules to solve problem-solving operations.

Vocabulary

Term	Definition
Pseudocode	A plain language description of the steps in an algorithm
If-Else statement	A programming conditional statement that defines two actions to be run depending on the result of a particular condition
Nesting	Organizing control structures such as if statements or loops within other control structures

Summary of the Lesson

Students use the pair programming technique to create a "Who Am I?" game via Twine. Students will research and collect 5-7 facts and/or primary sources about a historical figure (authors, scientists, famous Americans, famous artists, etc.). Students will then create a Twine presenting each fact/primary source. At the start of the game, students will create a name box (function), then call on the function throughout the game to personalize the game for the user.

Each Twine passage will include one clue, a link to the next clue, and an opportunity for the user to guess the historical figure.

Integration Opportunities

PS.1 and PS.3

Students create programs to model chemical reactions, simulate the behavior of particles in a physical system, or analyze experimental data using statistical functions with parameters.

Math 8.PFA.2

Students will use the block-based/text-based website pencilcode.net to graph a table of values that represent a function.

ELA 8.5

Using a [template](#), students will write code to create a poem using functions with parameters.

Music 8.1

Students will compose a sixteen-measure melody and work in groups to compare their piece to coding with functions and parameters.

Proficient	Developing	Emerging
The student can utilize research skills to collect 5-7 facts and/or primary sources about a historical figure. The student can create a game incorporating a function with parameters successfully.	The student can utilize research skills to collect 3-4 facts and/or primary sources about a historical figure. The student needs support to create a game incorporating a function with parameters.	The student can utilize research skills to collect 1-2 facts and primary sources about a historical figure. The student can not create a game incorporating a function but has demonstrated their understanding of a function.

8.2 Algorithms and Programming

The student will systematically test and refine programs using a range of test cases.



Curriculum Framework Summary

To ensure that a program meets its design goals, it is important to review and test it using a range of test cases. Test cases are specific inputs with expected outputs that assess the correctness of a program.

Programmers should test their programs with various inputs, including those outside the expected range. Edge cases, which test the extremes of a scenario, are commonly used to ensure that programs work with both large and small inputs. In beta testing, programmers use random people to test for bugs, and they keep track of program versions as they update and improve their code.

Prerequisite Knowledge

Students should have a basic knowledge of programming and debugging programs for errors.

Vocabulary

Term	Definition
Test Case	single input with an expected output to test the correctness of a program
Debugging	Systematically finding the cause of an error in a program and fixing it
Command	An instruction telling a computer program to do something

Summary of the Lesson

Students will work in groups to develop a list of questions or criteria to determine the credibility of a website. Divide students into groups and have each group develop a list of questions that can be used to determine if a website is a reliable source of information. Come back as a group and have students create one final list of criteria that can be used to determine website reliability. Once this is complete, give the students links to five websites making sure at least two [fake websites](#) are included. As a whole class go through each site testing the criteria developed by the class. After the class has finished the final site, as a whole group discuss what changes need to be made to the criteria to make it more effective. Draw correlations to how this works in programming using test cases to improve and make your programs correct.

Integration Opportunities

PS.1 Write programs that solve problems and conduct investigations by building models and debugging when errors occur with the following topics:

PS.2 Model atoms, phases of matter, matter interactions

PS.5 Model energy transfers

PS.6 Model wave energy

PS.7 Investigations of light, light waves

PS.8 Model Newton's laws

PS.9 Model transfer of electrons, model circuitry

Art 8.2 Using Scratch students create art projects using a variety of blocks experimenting with colors and shapes. Students will evaluate and analyze each other's code projects then use this feedback to make the project better.

Proficient	Developing	Emerging
The student will be able to systematically test and refine programs using a range of test cases with minimal guidance or support from the teacher. They will be able to identify and correct errors in their code by developing and implementing comprehensive test cases that cover a wide range of scenarios and edge cases.	The student will be able to test and refine programs using a range of test cases with moderate guidance or support from the teacher. The student will be able to use feedback from these test cases to make some improvements to their code, but may require assistance in identifying and correcting more complex errors.	The student will be able to test programs using basic test cases with significant guidance and support from the teacher. They will be able to identify some errors in their code for simple scenarios and straightforward edge cases. The student will require extensive support from the teacher in refining their code based on feedback from the test cases.

8.3 Algorithms and Programming

The student will explain how effective communication between participants is required for successful collaboration when developing programs.



Curriculum Framework Summary

Clear and effective communication is crucial in programming projects, particularly when breaking down tasks into modules and assigning them to different groups of students. Open communication helps to standardize the flow of the program and avoid redundancy or gaps in the necessary code. Peer review and program documentation are also important tools to foster effective communication and clarify the purpose of code sections or note troublesome areas for review between group members.

Prerequisite Knowledge

Students should have a foundational knowledge of programming and debugging programs collaboratively.

Vocabulary

Term	Definition
Documentation	material that provides official information or evidence or that serves as a record

Summary of the Lesson

Students will use code to model changes in potential energy as the distance between objects changes, and will communicate their results through written reflections and code comments. Start class by reviewing the concept of potential energy and how it is stored in systems when objects interact at a distance. Provide students with various objects and rulers, and ask them to work in pairs or small groups to plan and design a model using Scratch that demonstrates changes in potential energy as the distance between objects changes. Students are to document their code and feedback throughout as well as share their findings and ask questions of other groups. Each student will share their final project and demonstrate changes in potential energy. Have students reflect on the importance of documentation and feedback in their work.

Integration Opportunities

ELA 8.1

The student will participate in, collaborate in, and report on small-group learning activities.

ReS1: 7-8d

When given a hypothetical situation, students work together to develop a plan (program) to resolve the conflict, peacefully.

PS.2c

Work in groups to compose evidence-based conclusions, explanations, and arguments to identify changes in matter when thermal energy is added or taken away.

PS.5a

As a group, construct and use models to show that different amounts of potential energy are stored in the system when the arrangement of objects interacting at a distance changes and document the results from different distances.

Math 8.NS.2

Students will work in groups to describe and illustrate the relationships among the subsets of the real number system by using representations (graphic organizers, number lines, etc.). Each group will present them.

Proficient	Developing	Emerging
The student is able to describe the importance of effective communication in successful collaboration when developing programs and explain communication strategies used..	The student is able to identify examples of effective communication strategies that can facilitate successful collaboration when developing programs.	The student will be able to explain the potential consequences of poor communication in collaborative program development efforts and suggest ways to improve communication among team members.

8.4 Algorithms and Programming

The student will use flowcharts and/or pseudocode to address complex problems as algorithms.



Curriculum Framework Summary

In computer science, programs are developed using an iterative design process that includes design, programming, and debugging until the program functions correctly. The design stage comes before programming and involves gathering information about the problem and outlining a solution. Programmers may use pseudocode to check the program's flow and logic, or flowcharts to outline the steps needed to create an algorithm or program.

Prerequisite Knowledge

Seventh graders will expand on prior knowledge about iterative design cycles and planning with visual aids, both for individual and team work. They'll study problem decomposition methods, such as lean design and minimum viable product, to develop and assess programs. Eighth graders will focus on mapping out programs in detail using flowcharts or pseudocode before programming. This logical approach will help build their programming skills.

Vocabulary

Term	Definition
Flowchart	A type of diagram that represents the path and logic through a program
Pseudocode	Informal description of a program's logic, written in plain language like a programming language.

Summary of the Lesson

Students will use flowcharts and pseudocode to break down complex processes and problems into smaller, more manageable steps. By doing so, they can plan, organize, and communicate their ideas more effectively, making it easier to develop solutions to problems, design investigations, or create products. Whether it's in English, math, science, art, music, or health, the use of pseudocode and flowcharts provides a systematic and organized approach to simplifying complex processes and communicating ideas effectively.

Integration Opportunities

English 8.7

Use prewriting strategies to create a systematic writing product

Math 8.PFA.1

Simplifying algebraic expressions using a flowchart to map the order of operation

Art 8.2

Use flowcharts or graphic organizers to plan out a complex project, including timeframes and research needed

Physical Science PS.1

Design investigations, developing models with flowcharts or pseudocode to break down a larger process or problem

Health 8.1a

Create a flowchart or graphic representation of the brain and nervous system

Music 8.2, 8.3

Plan and design a musical number with pseudocode to demarcate the time signature, melody, instruments, etc.

Proficient	Developing	Emerging
Consistently demonstrates proficiency in using flowcharts and pseudocode to break down complex processes and problems into smaller, more manageable steps. Effectively plans, organizes, and communicates ideas.	Demonstrates some proficiency in using flowcharts and pseudocode to break down complex processes and problems into smaller, more manageable steps. May struggle with planning, organization, and communication.	Demonstrates limited proficiency in using flowcharts and pseudocode to break down complex processes and problems into smaller, more manageable steps. May struggle with planning, organization, and communication.





8.5 Computing Systems

The student will, using the elements of computing devices such as primary memory, secondary storage, processor, input and output devices, and network connectivity, analyze the advantages and limitations of a given computing system.

Curriculum Framework Summary

Computing devices can have significant differences in their functionality, speed, processing ability, data storage capacity, network speed, etc. due to hardware components and software choices. These differences should be considered when planning for the intended use of the device. For example, a computer that is optimized for gaming would have different capabilities and limitations compared to one designed for data manipulation or architectural rendering.

Prerequisite Knowledge

Students should have a basic understanding of the difference between hardware and software.

Vocabulary

Term	Definition
Motherboard	A printed circuit board that is inside a computer that aids in communication across components.
Network Interface Card (NIC)	A card (aka Ethernet card or network adapter) that allows a computer to connect to a network.
Central Processing Unit	The CPU is a chip on the motherboard that interprets input from peripheral devices.
Random-access memory	RAM is a hardware device that allows the computer to store and retrieve information.
Graphics Processing Unit	GPU is an electronic circuit used to speed up the creation of 2D and 3D images.

Summary of the Lesson

Students will research what the various components of a computer do and how to read and understand the specifications for a PC. Students will write a PC review for their fictional Computer Magazine. These reviews will help consumers to decide which PC purchase will be best for their needs. The students will create a review for a given scenario. The teacher will provide at least 3 scenarios from which students can choose. **Example Scenarios:** Purchasing a PC for gaming practice and competitions, Purchasing a PC for an artist who creates digital art, Purchasing a PC for a writer who wants to save manuscripts, Purchasing a PC for grandparents who want to store pictures and videos of their grandkids, etc.

Integration Opportunities

English 8.2, 8.7, 8.9

Students will use research, writing, and presentation skills to persuade a user to purchase the PC that they have recommended.

Math 8.PS.2

Find or create graphs that compare price to CPU speed or compare computation time for a given process by brand (Intel, AMD, etc) and make recommendations for buyers.

Physical Science 5 a,b; 9 b,c

Students investigate the transfer of energy that occurs when the CPU processes data. Students can identify the materials used to make computer components and what makes them good conductors or semiconductors.

Music 8.10

Students will focus on a scenario related to purchasing a PC to create, edit and present music. Which specifications will be best suited for this purpose?

Proficient	Developing	Emerging
Students can identify the individual hardware components of a computing device and compare its attributes with like components from different manufacturers. Students can understand the written hardware specifications of a computing device. Students can communicate the advantages and limitations of a given computing system for a specific use.	Students can identify the individual hardware components of a computing device and compare its attributes with like components from different manufacturers. Students can understand parts of the written hardware specifications of a computing device. Students can communicate the advantages and limitations of a component but do not relate them to a specific use.	Students can identify the individual hardware components of a computing device but are unable to compare its attributes with like components from different manufacturers.



8.6 Cybersecurity

The student will evaluate physical and digital security measures used to protect electronic information.



Curriculum Framework Summary

The student will evaluate physical and digital security measures. Examples of physical security measures include locking classrooms with devices, ID badges, surveillance cameras, fingerprints, shredding documents, etc. Digital security measures include firewalls, antivirus software, strong passwords, anti-spyware, etc. Both types of security measures protect us in different ways. Students will evaluate the physical and digital measures in existing computing system setups at school and make recommendations on improvements.

Prerequisite Knowledge

Students should have a foundational understanding of security measures including how people keep physical items safe and some general ideas of how digital information can be protected.

Vocabulary

Term	Definition
Digital footprint	The collection of data that is associated with your actions and communication on the Internet
Hacking	Gaining access to a website, program, or other resources you are not supposed to

Summary of the Lesson

Conduct a Think-Pair-Share around the questions, "What type of personal information is often shared on the internet?" Explain to students that this collection of someone's personal data is considered their digital footprint. Hackers often use someone's digital footprint to hack accounts, and/or send phishing scams to users. Although the internet has expanded communication worldwide and our access to information, we must take measures to protect that information. Physical and digital security measures are used to prevent unauthorized people or hackers from accessing information. Discuss the terms digital and physical security measures. Create a T-chart (physical vs. digital security measures) on the board. Ask students to work in pairs to sort examples of security measures. Students will then work in pairs/groups to complete a graphic organizer evaluating the physical and digital measures in an existing computing system setups at school (ex. classroom laptops/iPads, desktop computers in the library) and make at least one recommendation on how security measures can be improved.

Integration Opportunities

Physical Science PS.7b

Students will investigate and describe how electromagnetic energy can be used as a physical security measure (ex. x-ray machines, alarm systems, security lights).

Art 8.8 Discuss the ways that artists keep their digital art safer and ways that they could increase security (not allowing images to be saved, adding watermarks, NFTs)

Proficient	Developing	Emerging
The student can identify examples of physical and digital security measures, as well as explain how security measures protect electronic information. The student can evaluate the physical and digital measures in existing computing system setups and make recommendations for improvements.	The student can identify examples of physical and digital security measures, and explain how security measures protect electronic information. The student has not demonstrated the ability to evaluate the physical and digital measures in existing computing system setups or make recommendations for improvements.	The student has not demonstrated the ability to identify physical/digital security measures or explain how security measures protect electronic information. The student has not demonstrated the ability to evaluate the physical and digital measures in existing computing system setups or make recommendations for improvements.

8.7 Cybersecurity

The student will identify impacts of hacking, ransomware, scams, fake vulnerability scans, and the ethical and legal concerns involved.



Curriculum Framework Summary

Students will identify the problems and consequences of electronic crimes such as hacking, phishing, identity and password theft, ransomware, and scams. Hacking involves attempting to exploit computer systems or networks, while ransomware is malicious software that encrypts files until a ransom is paid. Students will discuss how unauthorized access to computer networks can lead to ethical and legal concerns, especially since we electronically store and transmit sensitive data more regularly than in the past.

Prerequisite Knowledge

Students should have a foundational knowledge of computers and the internet.

Vocabulary

Term	Definition
Cybersecurity	The study and practice of protecting computers and programs from unwanted access and theft of data
Internet	A global computer network consisting of multiple interconnected networks
Identity theft	The deliberate use of someone's personal data for financial gain or to harm their reputation
IP address	A numerical label that is assigned to each computing device on a network
URL	Uniform Resource Locator, or more commonly known as a web address

Integration Opportunities

Math 8.PS.2

Find case studies or graphs that show the change in cybercrimes in recent years. Students calculate the percent increase/decrease of money lost, the quantity of crimes or other relevant data.

English 8.7

Students can choose a type of cybersecurity breach to research further. Have student groups develop a persuasive argument related to their choice and present it to the class.

Summary of the Lesson

Create an account and share the [STEM Saga](#) comic with students. Have students research the terms listed in the essential skills and ask them to write a story, similar to the STEM Saga, explaining how to avoid these cybersecurity concerns. Perhaps different groups can write different parts of the saga, with each focusing on one aspect. Students may use [cybersecurity videos](#), [public WIFI](#), or [Digital Citizenship lessons](#) to do their research.

Proficient	Developing	Emerging
Students identify types of electronic crimes and the harm that they cause. Students are able to communicate how their behaviors can increase or decrease the risks of getting trapped by electronic crimes.	Students identify types of electronic crimes and the harm that they cause. Students can identify some behaviors that increase or decrease the risks of getting trapped by electronic crimes but do not see how it applies to themselves.	Students identify some types of electronic crimes and the harm that they cause. Students cannot communicate how these crimes apply to their own lives.



8.8 Data and Analysis

The student will explain the difference between a model and a simulation, and create computational models to conduct simulations



Curriculum Framework Summary

Models and simulations are used in various fields to visualize systems that are too large, too small or otherwise difficult to understand without a visualization. Simulations are models based on data. Simulations are used to imitate a situation (i.e. cars in various weather conditions, rocket launches or population growth). A model is a physical replica of an item, or process. Students will create a computational model to conduct a simulation.

Prerequisite Knowledge

To engage with this standard, students should have experience using models and simulations.

Vocabulary

Term	Definition
Model	Creating a representation of an idea, object, or a process
Simulation	The use of a model to replicate or imitate a situation or phenomenon

Summary of the Lesson

As a class, discuss the difference between a model and a simulation. Have students browse examples of models and simulations. Break students into pairs. Inform students they will be creating a computational model to conduct a simulation (e.g. epidemic outbreak, bungee jumping, temperature of ice). Each pair will use a graphic organizer to plan the design of the simulation. Students will use block based (eg. Scratch or StarLogo Nova) or Texted based (Java, Python) to design the simulation.

Integration Opportunities

Math 8.MG.3

Construct a three-dimensional model, given the top or bottom, side, and front views.

Physical Science PS.2a

Construct and use models and simulations to represent the structure of atoms.

Physical Science PS.5a

Construct and use models to show that different amounts of potential energy are stored in the system when the arrangement of objects interacting at a distance changes.

Physical Science PS.8a

Construct and use models and simulations to represent and/or explain motion.

Proficient	Developing	Emerging
The student can identify examples of models and explain how a model can represent a system (simulation). The student can also construct a computational model to conduct a simulation.	The student can identify examples of models and/or explain how a model can represent a system (simulation). The student needs additional support to construct a computational model to conduct a simulation.	The student can identify examples of models and/or explain how a model can represent a system (simulation), but can not create a computational model to conduct a simulation.



8.9 Impacts of Computing

The student will describe tradeoffs between allowing information to be public, and keeping information private.



Curriculum Framework Summary

In the US, the Fourth Amendment protects privacy, but it was written before the Internet, which has led to the exploitation of personal data by companies like Facebook, Google, and Amazon. Students will explore what information should be public and weigh the benefits and drawbacks of keeping information private versus making it public.

Prerequisite Knowledge

We analyze the pros and cons of making information accessible to explore the concept of a "trade-off." Previous grades have introduced the idea that communicating privately or publicly has both advantages and disadvantages.

Vocabulary

Term	Definition
Privacy	Protecting data or actions performed on a computing system
Public domain	All the creative works which have no intellectual property rights applied
Private sector	The part of the economy that is not under government control

Summary of the Lesson

Students will research and create a model showing the path of information shared when they create and post a piece of artwork, music or content on social media. Questions to consider:

- What type of control do you have over your information once it is on the internet?
- Who does your content belong to once it is posted?
- What are the benefits and drawbacks of sharing my personal art, music or video content?

Integration Opportunities

English 8.7

Students create a persuasive closing argument for the jury arguing that the defendant (a private sector company of their choosing) has infringed on their privacy or copyrighted material.

Math 8.CE.1

The student will solve practical problems involving consumer applications involving content creation or bringing an influencer by calculating the return on investment (ROI) for a company's sponsored post campaign when given the engagement rate, product cost and expected unit sales.

Visual Arts 8.8

Students will create and present an original piece of digital art that incorporates intellectual property principles and proper citation practices (ex. a digital painting, graphic design, 3D rendering, or any medium that fits their skill level and interest).

Music 8.8

Students will research intellectual property and investigate if it is legal or not to post a song on social media that you and a friend have covered.

World Geography.2

Explore and explain how technology has allowed us to modify and adapt the environment and the trade off between using resources and protecting the environment

Proficient	Developing	Emerging
The student understands the movement of information on the internet and the potential benefits and drawbacks of sharing their information to include content, art, music, etc. They are able to account for the impact the government, private sector and ordinary citizens can have on shared information.	The student understands the movement of information on the internet and the potential benefits and drawbacks of sharing their information to include content, art, music, etc. The student needs additional support to understand the impact the government, private sector and ordinary citizens can have on shared information.	The student understands the movement of information on the internet and the potential benefits and drawbacks of sharing their information to include content, art, music, etc. The student cannot provide examples of how the government, private sector and ordinary citizens can impact shared information.

8.10 Impacts of Computing

The student will evaluate online and print sources for appropriateness and credibility.



Curriculum Framework Summary

Although the Internet has simplified the research process, it has also enabled unverified and incorrect information sources to be presented as credible and equally valid as more thoroughly reviewed and researched sources. When researching, students must assess the credibility of sources related to a particular topic. To evaluate the reliability of online resources, students should consider several factors, such as Currency, Relevancy, Authority, Accuracy, and Purpose (CRAAP) Model.

Prerequisite Knowledge

Although there is no specific origin for 8.10 in the seventh grade standards, elementary education establishes a foundation for recognizing that information obtained online may not be reliable or accurate. Students are taught to identify and differentiate between trustworthy and untrustworthy sources of information online.

Summary of the Lesson

This lesson will teach students how to evaluate sources for credibility and accuracy when conducting research using the CRAAP model, which consists of five factors: Currency, Relevancy, Authority, Accuracy, and Purpose. Students will learn how to differentiate between valid and unreliable sources, recognize slant, and assess the validity of information found in research. They will be given opportunities to evaluate websites, advertisements for healthy food and beverage choices, and sources for drug and/or disease prevention methods. By evaluating online resources using the CRAAP model, students can make informed decisions about the sources they use in their research and ensure the credibility and accuracy of their work. By the end of the lesson, students will be able to use valid and vetted sources to justify and defend their conclusions, evaluate information for credibility, and evaluate online and print sources for appropriateness and credibility.

Integration Opportunities

English 8.9

While researching, discuss how to tell which information is most credible and trustworthy and how to evaluate sites.

Physical Science PS.1

Evaluate information found in research for validity and credibility.

Health 8.3h, 8.3i, 8.3j

When researching methods for drug and/or disease prevention, monitor the sites for credibility and accuracy.

Health 8.3e

Evaluate advertising for healthy food and beverage choices.

Skills WG i.

Students will evaluate sources for credibility and create a product (e.g. presentation or research paper comparing regions) demonstrating their knowledge of research, content and world geography.

Proficient	Developing	Emerging
Applies all five CRAAP factors to evaluate sources, understands and explains the importance of credibility in research, consistently evaluates sources for appropriateness, accuracy, and credibility, recognizes slant and accounts for it, effectively uses valid and vetted sources to justify and defend conclusions.	Generally applies the CRAAP model, but with some difficulty or inconsistency. Has some understanding of credibility, but may need reinforcement. Evaluates sources for appropriateness, accuracy, and credibility with some gaps or inconsistencies. Demonstrates awareness of slant, but may not always account for it in research. Can use valid and vetted sources to justify and defend some conclusions, but may require support or guidance.	Limited understanding and application of the CRAAP model, credibility, and source evaluation, as well as limited awareness of slant, leading to difficulty in using valid sources to defend conclusions.



8.11 Impacts of Computing

The student will discuss the social impacts and ethical considerations associated with the field of cybersecurity.

Curriculum Framework Summary

The field of cybersecurity is becoming increasingly important as more personal, financial, governmental, and military information is transmitted and stored electronically. Today's cybersecurity threats are complex, including breaches of private information, ransomware attacks, and global threats from hackers. Cybersecurity is essential for protecting individual privacy, military information, financial data, and social media profiles. Both physical and digital security measures must be practiced to prevent cyberthreats. In eighth grade, students will evaluate the benefits of cybersecurity against the potential drawbacks of content and delivery restrictions.

Prerequisite Knowledge

Although there is no specific standard for 8.11 in the seventh grade standards, previous standards in the impacts of computing strand have assessed the social and ethical implications of various technologies.

Vocabulary

Term	Definition
Cybersecurity	The study and practice of protecting computers and programs from unwanted access and theft of data

Summary of the Lesson

Begin with an introduction to the field of cybersecurity, emphasizing its significance in the future's interconnected world. Students will research about the various threats and risks that individuals, organizations, and governments will face in cyberspace, including data breaches, hacking, identity theft, and cyber warfare. Throughout the lesson, students will engage in group discussions, case studies, and thought-provoking exercises that encourage critical thinking and ethical reasoning.

Integration Opportunities

Health 8.1l, 8.2l, 8.3l
Examine and create a personal plan for online gaming and social media use.

Health 8.1m, 8.2m, 8.3m
Research effects of social media and create a personal plan for usage.

Math 8.PS.1
Students can analyze the probability of a hacker gaining unauthorized access to a company's database (dependent event) versus the probability of a company experiencing a cyber-attack (independent event) and the implications of these attacks.

Theater Arts 8.2a
Research and create a short theatrical performance piece that explores social impacts and ethical considerations associated with the field of cybersecurity.

Proficient	Developing	Emerging
Students are able to articulate the potential risks and benefits of future cybersecurity measures, recognize the importance of ethical decision-making, and discuss the broader implications of computing technologies on future society.	Students can explain potential risks and benefits of cybersecurity by naming specific threats but cannot explain the ethical impact of future changes in the field or of the societal impacts that may occur because of technological advancements.	Students have limited understanding of the importance of cybersecurity and require significant support to evaluate the societal and ethical impacts of cybersecurity methods.



8.12 Impacts of Computing

The student will explore careers related to the field of cybersecurity.

CodeVA

Curriculum Framework Summary

The field of cybersecurity has experienced exponential growth in recent years due to the increasing value of information and resources and the emergence of various cybersecurity threats. This has led to the creation of various job opportunities such as security software developers, information security analysts, ethical hackers (white hat), computer forensics analysts, and more. In eighth grade, students will get an opportunity to explore different aspects of these careers, including the job responsibilities, expected pay rates, and education requirements. You can find current information on education, pay, and future employment prospects by visiting the website of the U.S. Bureau of Labor Statistics (<https://www.bls.gov/emp/>).

Prerequisite Knowledge

In seventh grade students explore possible careers that help to expand, maintain, and provide the internet to a majority of the world's population (4.57 billion users, April 2020, Statista.com) In eighth grade, students will look specifically at careers that are related to the field of cybersecurity.

Vocabulary

Term	Definition
Cybersecurity	The study and practice of protecting computers and programs from unwanted access and theft of data

Summary of the Lesson

Students will engage in a multidisciplinary exploration of the field of cybersecurity by researching the education and training requirements, job responsibilities, and salary potential of various careers, while also developing creative projects that highlight the skills and qualities necessary for success in the industry, and analyzing the costs and benefits of pursuing a cybersecurity career. Additionally, they can examine the physical demands and fitness requirements of cybersecurity professionals to gain a deeper understanding of the importance of physical wellness in the workplace.

Integration Opportunities

English 8.7, 8.9

Investigate a career and research the pay, salary, degree/training requirements

Visual Arts 8.9

Have students design and create posters showcasing the skills and qualities necessary for success in a cybersecurity career.

Visual Arts 8.10

Have students design digital artwork that depicts a specific cybersecurity career and share it on social media to raise awareness of the field's significance.

Physical Education 8.2a

Students will explore how the body's systems interact during physical activity, and then research and analyze the physical demands and fitness requirements of careers in cybersecurity to gain a better understanding of the importance of physical wellness in the workplace.

Proficient	Developing	Emerging
Students demonstrate understanding of cybersecurity careers, researches and presents findings, analyzes costs and benefits, and develops a creative project showcasing skills for success.	Students demonstrate some understanding of cybersecurity careers, partially researches and presents findings, partially analyzes costs and benefits, and partially develops a creative project showcasing skills for success.	Students can demonstrate a limited understanding of cybersecurity careers, minimal research and presentation of findings, limited analysis of costs and benefits, and limited development of a creative project showcasing skills for success.

8.13 Networking and the Internet

The student will identify existing cybersecurity concerns associated with Internet use and Internet-based systems and potential options to address these issues.



Curriculum Framework Summary

Cybersecurity risks can come in many forms and can have serious consequences. For example, hacking can be very harmful and the level of damage caused depends on how much access the hackers have gained. Some cybersecurity breaches include the stealing of personal information such as social security and credit information from companies like Experian. Malware can also cause harm by infecting systems and performing unwanted actions. Denial-of-service attacks can cause long-term damage to online businesses and impact their finances. Students will learn about potential risks associated with using the internet and explore the ways companies prepare for and protect against cyber threats.

Prerequisite Knowledge

Students should have a foundational knowledge of cybersecurity risks and concerns.

Vocabulary

Term	Definition
Hacker	A person who uses computers to gain unauthorized access to data.
Malware	Software that is intentionally designed to cause damage to a computer, server, or network.
Denial-of-Service attack	A cyber-attack where a machine is flooded with simple requests making it unable to respond to more meaningful requests.
Phishing	The fraudulent practice of sending emails purporting to be from reputable companies in order to induce individuals to reveal personal information, such as passwords and credit card numbers.

Summary of the Lesson

Develop a simulation that would provide students with a realistic experience that helps them understand the importance of cybersecurity and the potential consequences of a cybersecurity breach. For example, students receive an email that appears to be from a trusted source, but is actually a link to a phishing site that asks for their login information. The simulation can include a fake login page that captures usernames and passwords. The security steps should include: Identify the threat, investigate the threat, assess the damage, develop a response plan, implement the response plan, debrief and evaluate. The teacher would present the scenario information to students as they reach the relevant step in the simulation.

Integration Opportunities

Math 8.PS.1

Students can calculate the probability of different outcomes in the simulation. For example, they can calculate the probability of a user clicking on a phishing link, the probability of a successful ransomware attack, or the probability of a denial-of-service attack succeeding.

English 8.6

Students can read articles or reports about real-life cybersecurity incidents. They can then answer questions about the incidents, analyze the language used in the articles, and discuss the impact of the incidents.

Proficient	Developing	Emerging
Students can identify the threat and communicate why this issue is a threat. The response plan outlines all the steps that must be taken to reduce or eliminate this threat. The response plan also communicates the short term or long term solutions to be put in place and how future risks are monitored and/or controlled.	Students can identify the threat and communicate why this issue is a threat. The response plan outlines some of the steps that must be taken to reduce or eliminate this threat.	Students can identify the threat and communicate why this issue is a threat. The response plan outlines one or two of the steps that must be taken to reduce or eliminate this threat.

