

7.1a 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,
a. combining control structures such as if-statements and loops including compound conditionals.



Curriculum Framework Summary

Programs are collections of code organized in algorithms that can accomplish a variety of tasks (ie. perform calculations, manipulate data or to express creativity). Students will use block-based or text-based programming language, to construct a program to accomplish a task. Students will incorporate compound conditionals ("if-and" and "if-or" statements) within their program. Compound conditionals require more than one condition to be true or else the entire statement is determined to be false, which adds complexity and increases the efficiency of a program.

Prerequisite Knowledge

To engage with this standard, students need to have a foundational understanding of computing, the use of technology and block-based programming in Scratch.

Vocabulary

Term	Definition
If-statements	A programming conditional statement that, if proved true, performs a function or displays information
Compound Conditionals	The use of multiple conditions joined by AND or OR in a control structure

Summary of the Lesson

Students work in pairs to create a digital story, game, or animation via Scratch. Students will use the [pair programming technique](#) to complete the task. Students should incorporate at least two compound conditional statements and investigate how these statements can reduce the amount of code needed in a program. Once the task is completed, students will test their program and debug any errors and share their product via presentation to the class or a learning management system (LMS).

Integration Opportunities

CE.9

Design a program that uses variables to remember when users visit passages to examine the role of media in the Civil Rights movement

Math 7.PFA.2

The student will create an algebraic equation solver via Scratch.

Science: LS.9a

The student will create a story via Scratch demonstrating an understanding of the ecosystem dynamics and human activity via Scratch. The student will include at least two compound conditional statements within the story.

English 7.5

The student will create a 'choose your own adventure' story via Scratch, incorporating at least 2 compound conditional statements.

Workplace Readiness Skills

- 10. Teamwork
- 13. Continuous Learning and Adaptability
- 14. Efficiency and Productivity
- 15. Information Literacy
- 18. Job Specific Tools and Technologies
- 21. Reading and Writing

Proficient	Developing	Emerging
The student can work with a partner to create a story via Scratch incorporating at least two compound conditional statements.	The student can work with a partner to create a story via Scratch incorporating at least 1 compound conditional statement.	The student cannot work with a partner to create a story incorporating compound conditional statements via Scratch.



7.1b 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, creating clearly named variables that represent different data types, including numeric and non-numeric data, and perform operations on their values.



Curriculum Framework Summary

Variables are placeholders or “buckets” where data is stored. On the outside of the “bucket” there is a name (ex. score) that is used to identify the bucket. On the inside of the bucket is the value, values can be numbers, text or other non-numeric data. Students will use block-based or text-based programming language, to construct a program that utilizes a variable.

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
If-statements	The use of multiple conditions joined by AND or OR in a control structure
Compound Conditionals	A programming conditional statement that, if proved true, performs a function or displays information

Summary of the Lesson

Students will work in pairs to create a pong game using a block based program (ex. Scratch). Students will incorporate a variable within the game to keep score. In the pong game the user will move a paddle to bounce a ball or another object, each time the ball/object bounces off the paddle the user will receive a point.

Integration Opportunities

Math 7.CE.1

Students create a quiz-based game using block based programming (ex. Scratch) or a text based programming language and incorporate a variable to keep track of the user's correct responses. The user will be asked to solve practical problems involving operations with rational numbers.

Life Science LS.10

Students create a sorting game using block based programming (ex. Scratch) or a text based programming language and incorporate a variable to keep track of the user's correct responses. The user will be asked to sort inherited and non-inherited traits.

CE.6

Interview someone who has become a citizen through the naturalization process, and describe the process this person experienced in a program

English 7.7

Students create an interactive narrative via Twine, incorporating a counting variable of passages visited by the user.

Proficient	Developing	Emerging
The student can work with a partner to construct a program and incorporate a variable appropriately to meet the desired outcome.	The student can work with a partner to construct a program and incorporate a variable appropriately to meet the desired outcome.	The student can define the term variable in relation to programming but has not demonstrated their ability to construct a program to accomplish a task and incorporate a variable to meet the desired outcome.



7.2 Algorithms and Programming

The student will document programs to make them easier to follow, test, and debug.



Curriculum Framework Summary

As they create a program, students will notate each step of the process to explain how a particular part of the program should work or how to use it. This documentation can be written text or illustrations and can be embedded in the program code or as a separate document. Documenting helps the programmers keep track of all parts of the development process, debug code and remind the programmer of the intent behind previously created code.

Prerequisite Knowledge

To engage with this standard, students should have experience tracing and debugging programs or editing documents or student work for correctness.

Vocabulary

Term	Definition
Debugging	Systematically finding the cause of an error in a program and fixing it.
Documentation	Written text or illustrations that describe a program to its users or other programmers.

Summary of the Lesson

Working with a partner, students will design a program (in Scratch or a similar program) with character animation. One student will serve as the driver who types out the code and the other will serve as the navigator documenting the coding process. Partners will switch roles and notate this change in their documentation. After completing their program, students will trade their work with another partner pair in class and follow the new set of documentation to test and create a replication of the program. Partner pairs will offer feedback on the documentation and debug or correct their original program as needed.

Integration Opportunities

Life Science 2.d

Students will create a visual using Scratch or a similar program to sequence the steps in the cell cycle, including mitosis. Students will document their process and peer review to test and debug when needed.

Visual Arts 7.2a

Students will record short videos to document the steps of their creative process when constructing a new art piece. Videos may include documentary-style elements such as voice-over narration or illustrations.

English 7.7n

Students will brainstorm and create a troubleshooting document for how to solve a common problem in the classroom. Students will conduct tests of their instructions and provide and use peer feedback to revise.

<i>Proficient</i>	<i>Developing</i>	<i>Emerging</i>
The student can create and embed proper documentation into a designed program and interpret documentation in an existing program.	The student demonstrates their understanding of program documentation but parts of their documentation are missing or unclear.	The student cannot demonstrate their understanding of program documentation.



7.3 Algorithms and Programming

The student will distribute tasks and maintain a project timeline when collaboratively developing computational artifacts.



Curriculum Framework Summary

Students will work collaboratively to create a computational artifact (e.g. code, program, image, audio, video, presentation, or web page file) by using a project timeline to manage their work. This timeline will be used to set group member expectations and responsibilities by identifying and delegating tasks, monitoring work in progress, allowing for peer review, and setting deadlines. Student groups might require teacher support and scaffolding in constructing an appropriate and realistic timeline as well as regular reminders to refer back and revise timelines if needed throughout the development process.

Prerequisite Knowledge

To engage with this standard, students need to have experience with creating a product on the computer. Students will also need to draw on previous experiences working with partners (either pair programming or small groups) as well as experience with peer reviewing and revising a product

Vocabulary

Term	Definition
Computational artifact	Anything created by a human using a computer or device.
Timeline	A graphic representation of events in chronological order.

Summary of the Lesson

Working in groups of 3-4, students will identify which type of computational artifact is needed to address the assignment and the date the final product is due (recommended time is one week). Creating a visual timeline, groups will break the project down into individual tasks, establish group and product expectations and determine deadlines by which each task should be completed. Time for internal peer feedback on tasks should also be allotted in their plan. Tasks will be delegated to group members with each using the timeline to track and update their progress. Revisions to the timeline and tasks should be discussed and approved by all group members. Groups will submit their timeline and final product to their teacher and present their work to the class.

Integration Opportunities

English 7.5

Students will select a book club text and collaboratively create a podcast review of the book. Students must plan deadlines for sections to be read, questions to address, and designate which group member will host each episode.

LS.5c

Students will plan and create a public service campaign about how human actions can positively and negatively affect the populations of producers, consumers, and decomposers in a specific ecosystem.

Proficient	Developing	Emerging
The student can work collaboratively to maintain a project timeline and complete individual tasks on time.	The student actively participates with a group but struggles to complete individual tasks in a timely manner.	The student cannot demonstrate their ability to work collaboratively and complete individual tasks in a timely manner.

7.4 Algorithms and Programming

The student will decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.



Curriculum Framework Summary

Students can use the decomposition of problems into small subproblems to tackle large tasks in a more efficient way. When decomposing, it allows students to collaborate to divide and conquer large tasks or challenges. Students can use this in the planning and design stage, or in reviewing and debugging their programs or the programs of others.

Prerequisite Knowledge

To engage with this standard, students need to understand decomposing as taking a larger problem, task, or list and breaking it into smaller, more manageable chunks with the goal of being more efficient in solving problems. This could be done in mathematical problem solving, daily tasks, or in goal setting.

Vocabulary

Term	Definition
Decompose	System of program design that involves breaking problem down into smaller tasks
Subprogram	A section of code designed to complete a task that is used multiple times within a program
Subproblems	Part of a larger problem

Summary of the Lesson

Students will collaborate using programming in Scratch to digitally draw and transform right triangles and quadrilaterals. Students can use decomposition to break the task into subparts: determining the necessary characteristics of their chosen shape, creating a program that correctly develops that shape, and adding onto their program to take the same shape and translate or reflect it on the coordinate plane. Groups will exchange programs for review to debug, if necessary, to accomplish the task. Through decomposing the task into multiple parts, students will create a program that demonstrates a translation or reflection of a shape on the coordinate plane.

Integration Opportunities

Math 7.MG.3

The student will a) compare and contrast quadrilaterals based on their properties; and b) determine unknown side lengths or angle measures of quadrilaterals.

Math 7.PFA.4

The student will solve one- and two-step linear inequalities in one variable, including practical problems, involving addition, subtraction, multiplication, and division, and graph the solution on a number line

LS.3

The student will investigate and understand that living things show patterns of cellular organization. Key concepts include a) cells, tissues, organs, and systems; and b) patterns of cellular organization and their relationship to life processes in living things.

LS.10 & .11

The student will investigate and understand the relationships between ecosystem dynamics and human activity. The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic and change over time. Key ideas include large-scale changes such as eutrophication, climate changes, and catastrophic disturbances that affect ecosystems and environmental issues

Proficient	Developing	Emerging
The student can decompose complex, multistep problems into smaller parts to successfully find a solution.	The student is able to decompose a complex problem into smaller parts but is unable to solve the problem using this strategy.	The student is unable to decompose problems into smaller subproblems to make problem-solving more efficient.

7.5 Computing Systems

The student will describe how the Internet connects devices and networks all over the world.



Curriculum Framework Summary

Students will explain that the Internet is a network of computers connecting devices like laptops, smartphones, PCs, and game consoles around the world through web servers. These web servers are computers that host websites for other devices in the network to access. Uploading is when a device sends information to a web server. Downloading is when a device receives information from a server. Students will explore the effects the Internet has had on global communications such as news media, business, entertainment, education, and socialization and the way people connect, share and relate to information.

Prerequisite Knowledge

To engage with this standard, students need to know that a network is a group of interconnected computers and devices. Networks allow computers to share resources.

Vocabulary

Term	Definition
Internet	A global computer network consisting of multiple interconnected networks.

Summary of the Lesson

Students will work in small groups to simulate how the internet connects devices in worldwide networks. Each group will be assigned an example of global communication (i.e. messaging apps, video conferencing, business, or education) and plan a simulation showing how a user sends information through the Internet to a server, how the message is received, and how information is returned to the user. Groups will investigate how the Internet has impacted their particular example of global communication. Individually, students will create a diagram of how networks communicate and how we access them. Key concepts include the function of the Internet, a device, a web server, and what is meant by downloading and uploading information

Integration Opportunities

Math 7.PS.2

Students will track their daily screen time in minutes throughout one week (including home and school usage) and compile a classroom dataset. Students will create a histogram showing the frequency of weekly internet usage and compare their usage to the national average.

English 7.3e

Students will create a public service announcement segmented by audience with different targeted messages and explain how using the internet allows them to reach these audiences.

<i>Proficient</i>	<i>Developing</i>	<i>Emerging</i>
The student can work collaboratively to simulate the function of the internet and explain in detail the process of sending and receiving information.	The student is able to demonstrate some aspects of the Internet network but is unable to explain the complete process in detail.	The student cannot demonstrate their understanding of internet networks or connections.



7.6 Cybersecurity

The student will describe how physical and digital security measures protect electronic information.



Curriculum Framework Summary

The student will explore 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 be able to apply their knowledge of security measures to real-life scenarios..

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
Password	A secret word or phrase that must be used to gain admission to something
Firewall	A part of a computer system or network which is designed to block unauthorized access while permitting outward communication

Summary of the Lesson

As a class, discuss different types of security measures and understand how each one protects us in different ways from different types of electronic breaches and attacks. Students can then apply their knowledge of security measures by completing one of the following activities:

1. Students work in pairs engaging in [NOVA Labs cybersecurity game](#). During the game students take on a role as a chief technology officer of a social network company and have to protect the company from a cyber attack.
2. Students work in groups to solve a [Breakout EDU kit](#) or digital breakout with multiple online locks.

Once the students have completed the activity, students will journal about their experience. Students should reflect on what security measures were used and how it protected the data.

Integration Opportunities

Life Science LS.10c

Students differentiate between characteristics that can be inherited and those that cannot be inherited. The non-inherited traits can be used as a physical security measure. (ex, Fingerprints, eye scan of retina)

English 7.2

Students are provided a scenario. Students take on the role of the chief academic technology officer of a company/ school district. Students work as a group to create a presentation of the areas in which security is lacking and what measures need to be taken to increase security.

Proficient	Developing	Emerging
The student understands the difference between digital and physical security and can explain how these security measures can be applied in a setting.	The student understands the difference between digital and physical security but can't explain how these security measures can be applied in a setting.	The student cannot demonstrate their understanding of digital and physical security or how these security measures are applied in a setting.

7.7 Cybersecurity

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



Curriculum Framework Summary

Cybersecurity is a growing industry in the world as more of our personal, financial, government, and military information is transmitted electronically and housed in data centers. Today's cybersecurity concerns are varied and complex. As students work through becoming a Cybersecurity expert, they will create a public informational document to help prevent identity theft.

Prerequisite Knowledge

Students should have a foundational understanding of security measures including how to keep physical items safe and some general ideas of how digital information is processed and shared.

Vocabulary

Term	Definition
Cybersecurity	The study and practice of protecting computers and programs from unwanted access and theft of data
Identity theft	The deliberate use of someone's personal data for financial gain or to harm their reputation

Summary of the Lesson

As a class students discuss world Cyberattacks while viewing [Fortinet](#) live map. Students then work in pairs to research cyberattacks, the risks of public devices and wifi, and physical and digital security measures for personal safety. Students will begin at [Norton](#) information and apply research skills to locate more information. Once researched students will plan, design, and create an infographic.

Integration Opportunities

Math 7.PS.2

Students will make observations and inferences about cybersecurity data represented in histograms and other forms.

CE.9. .7

Discuss the history of the internet and its impact on our lives, specifically social media. Break students into groups. Provide each group with a series of events (provided descriptions and pictures, no dates), that led to the internet as we know it today. Students must then work as a group to reconstruct the timeline accurately, using hints from the description of events and pictures.

PE 7.1

Students engage in "Hacker in the middle" game. Break students up in groups of 8. One student will serve as the sender, four students will serve as the routers, 2 will serve as the hackers and 1 student will be the receiver. As a group students must create a message to send. The students will then write the message on three beach balls (no more than one word on each ball). The ultimate goal is to get the message to the receiver, in a certain time frame without the hackers intercepting the message.

English 7.6-7.9

Students will research and create an infographic on personal cybersecurity guidelines.

Proficient	Developing	Emerging
The student can plan and create an infographic identifying cybersecurity concerns and naming specific preventions that middle school students can take to protect their digital footprint and personal information.	The student can identify cybersecurity concerns for middle school students and 3-4 preventions that they can take to protect their information.	The student cannot identify cybersecurity concerns or name more than one preventative measure to protect their information.



7.8 Data & Analysis

The student will discuss the correctness of a model representing a system by comparing the model's generated results with data that were observed in the system being modeled.



Curriculum Framework Summary

Models and simulations are necessary for students to represent systems that are too large, too small, or difficult to study. Models and simulations are based on data and are used to create and test hypotheses. Models and simulations need to be tested for accuracy and refined as necessary.

Prerequisite Knowledge

Students should have a foundational understanding of how computer models and simulations are used to formulate, refine, and test hypotheses.

Vocabulary

Term	Definition
Data	Facts and statistics collected together for reference or analysis
Parameter	A special value that is used to further define the action of a function
Output	Data that is produced by a program for the user or by another program
Input	Data that is fed into a program to be processed

Summary of the Lesson

Virtual simulations are excellent opportunities to analyze data, but must be compared with observed data to determine the correctness of a model. Students will use the KidWind Challenge on Whitebox Learning to create and analyze wind turbines. After completing virtual designs students will build physical models using either a 3D printer or manual construction. Students will test and document the observations of their physical model. Students will compare and contrast the results in a class presentation.

Integration Opportunities

Math 7.PS.2

Students will predict people's height using the golden ratio of $y=mx$ and then determine the slope, m , as a rate of change.

Physical Science/Life Science 1

Discuss and practice the Engineering Design Process to predict hypotheses, produce, evaluate, and interpret data.

English 7.6-7.9

Students will research and create an expository essay comparing and contrasting data from models.

Proficient	Developing	Emerging
The student can analyze the virtual results with the physical build results and modify their model for accuracy.	The student can virtually build and run the simulation for the Wind Challenge.	The student cannot identify or analyze simulator results for the Wind Challenge.



7.9 Data and Analysis

The student will refine computational models based on the data they have generated.



Curriculum Framework Summary

Computational models are used in various fields of study to represent real-world scenarios. Designing a model and refining it based on the data, provides the model with validity and deems the results as relevant. Students will refine a computational model to simulate a system.

Prerequisite Knowledge

Students should have previous experience using block coding software.

Vocabulary

Term	Definition
Computational thinking	A set of problem-solving methods that express problems and their solutions in a way that a computer could execute.
Command	An instruction telling a computer program to do something.
Variable	Programming element that can hold a numeric or nonnumeric value.

Summary of the Lesson

To ensure a computational model is valid it's important to test the model against real-world data and refine the model as needed. Students will test and refine a computational model they previously created or use the [starter project of the spread of an epidemic via StarLogo NOVA](#). Students will compare the data provided by the computational model to real-world data. Students should notate any limitations of the model, inaccuracies, the changes made to the simulation, and how the changes improve the validity of the computational model.

Integration Opportunities

Life Science LS. 1 & LS. 11

Students will use PhET Interactive Simulations of natural selection to interpret data and describe how changes in the environment can bring about changes in a species.

Project GUTS (Growing Up Thinking Scientifically) also has ready-to-run simulations for ecosystems, epidemics, energy transfer, and more. CodeVA offers this course to train teachers in implementing GUTS each summer.

CE.11

Students use the Parable of the Polygons (ncase.me/polygons/) simulation, to determine the role diversity plays in affecting the economic and political structure of the United States.

Math 7.PS.2

Students will use a table to collect data and then create a histogram of the data collected using a Microsoft Excel spreadsheet. Students will then compare data represented in histograms with the same data represented in line plots, circle graphs, and stem-and-leaf plots.

Proficient	Developing	Emerging
The student uses data to assess and explain the limitations and/or inaccuracies of a computational model. The student can modify a model to more accurately represent a system when the model does not match the data.	The student uses minimal relevant data to explain how the design addresses the limitations or identifies a potential redesign with little explanation and supporting evidence. The student can modify a model to more accurately represent a system when the model does not match the data.	The student uses inaccurate or insignificant data to test the limitations and inaccuracies of a computational model. The student needs significant support to modify the computational model.



7.10 Impacts of Computing

The students will explain how advances in technology have contributed to Virginia's prosperity and role in the global economy.



Curriculum Framework Summary

Virginia is a leader in technology in a variety of ways from transportation to agriculture to shipbuilding. All of these technological advances have made Virginia prosperous and a leader in the global economy. Students will look into the different ways industry and technology have helped Virginia emerge as a leader.

Prerequisite Knowledge

Students should recognize how computing has impacted innovations in other fields throughout history.

Vocabulary

Term	Definition
Technology	Computing devices and skills used in production or investigation
Global Economy	The international exchange of goods and services
Goods and Services	The products and actions exchanged for money in an economy

Summary of the Lesson

Students will use a variety of online resources to research the impact of technology in Virginia since the early 20th century. Technologies will include, but not be limited to transportation, communications, and advancements in agriculture. Once compiling information, students will create a timeline using Sutori to depict the development of technology in Virginia throughout the 20th century to present with a focus on the impact Virginia technology had on the world.

Integration Opportunities

Math 7.PS.2

Students will build a histogram using a data table based on the growth of the technology industry in Virginia.

ELA 7.9

The student research and create a timeline of the advances in technology in Virginia post WWII and how this technology has impacted the economy.

Civics and Economics CE.12g

Students will work in groups to choose a region on the Virginia [Digital Dominion map](#) and analyze the role that region has played in the U.S. and global economies, with an emphasis on the effect of technological innovations.

Proficient	Developing	Emerging
Students are able to identify advances in technology in Virginia and explain the contributions based on technology to Virginia's prosperity and the role Virginia technology has within the global economy.	Students are able to identify advances in technology in Virginia and explain the contributions based on technology to Virginia's prosperity BUT are not able to explain the role Virginia technology has within the global economy.	Students are able to identify advances in technology in Virginia BUT are not able to explain the contributions based on technology to Virginia's prosperity and the role Virginia technology has within the global economy.



7.11 Impacts of Computing

The student will describe the development of new technologies in communication, entertainment, and business and their impact on American life.



Curriculum Framework Summary

Students will investigate new and developing technologies and analyze the cause and effect nature between these and American society, economy, and culture. Advances in technology greatly influence society in many ways including but not limited to how people interact, how data is stored, financial transactions, and data security. Students will focus on the communication, entertainment, and business industries and assess how the impact of new technologies has been positive, negative, helpful, or useful.

Prerequisite Knowledge

To engage with this standard, students need to be able to identify and articulate cause-and-effect relationships. Students will also need experience with online research and investigation.

Vocabulary

Term	Definition
Automation	The use of largely automatic equipment in a manufacturing system or other production processes.
Culture	The customs, arts, social institutions, and achievements of a particular nation, people, or other social groups.
Data	Facts and statistics collected together for reference or analysis.
Technology	Computing devices and skills used in production or investigation.

Summary of the Lesson

Students will select new or developing technological advancement to research in either the communication, entertainment, or business industry. Students will identify ways in which this new technology has had both a positive and negative effect on American culture, society, or the economy. Advancements may include communications (social media, Internet of things, driverless cars, security and privacy, networking, branding, funnel marketing), entertainment (digital music, video streaming, voice technology, licensing, holograms), business (traceability and safety software, automation, augmented reality).

Integration Opportunities

CE.9

Consider the role of the media in political campaigns, and how some private information is revealed

English 7.3a

The student will analyze the intended purpose and impact of a social media message/campaign by identifying the persuasive techniques utilized.

English 7.3d

The student will create two persuasive media messages utilizing different techniques to determine which techniques are the most effective. Messages must have an intended audience, purpose, format, and content.

Proficient	Developing	Emerging
The student can identify and describe the development of new technology and explain in detail the positive and negative impacts on American society, culture, or economy.	The student can identify and describe the development of new technology but is unable to expand on the impact on American society, culture, or economy in detail.	The student is unable to describe developments of new technology and their impact on American society, culture, or economy.



7.12 Impacts of Computing

The student will explore careers related to the Internet.



Curriculum Framework Summary

Students will explore careers relating to data collection and analysis, including pay rate, education required, and type of work. These types of careers are in great demand, including data analyst, data scientist, data engineer, and data architect, and use a variety of skills, including using a variety of software and models and simulations.

Prerequisite Knowledge

To engage with this standard, students need to have an understanding of data collection and analysis skills and research skills.

Vocabulary

Term	Definition
Pay Rate	The amount of money workers are paid by hour, week, etc.
Salary	The amount of money works are paid as described by an employment contract
Career Pathway	A series of connected education programs and courses that prepare students for a particular career
Workplace Readiness Skills	The basic academic, critical thinking and personal skills necessary to maintain employment
Internet	A global computer network consisting of multiple interconnected networks

Summary of the Lesson

Students work in groups to research one of the four named careers in Data Collection and Analysis: data analyst, data scientist, data architect, and data engineer. Students break the tasks down and divide the work amongst group members. Key points to include in their research: pay scale, skills needed, education or training needed, work environment, demand, pros and cons, what influences the demand of this career, locations where this career may be prominent, whether the career has demand locally, and what languages or programming skills are needed. Groups will share their information and create a presentation to share their learning.

Integration Opportunities

English 7.6

Students read nonfiction texts about careers in the field of data collection and analysis, and then summarize their learning, organize and synthesize it through a project or written output, and/or show a correlation or lack of correlation between multiple sources of information by providing textual evidence.

English 7.7

Students write about their findings in researching a data collection and analysis career and present their findings.

English 7.9

Students find, evaluate and select appropriate resources for a research project on careers in the field of data collection and analysis. Students will collect information from a variety of sources, synthesize it into a research project, and provide citations to works used.

CE.14

Students will research careers related to the Internet, skills and interests that may lead to those careers, and the demand for these careers in the US economy.

Workplace Readiness Skills

- 13. Continuous Learning and Adaptability
- 14. Efficiency and Productivity
- 15. Information Literacy
- 18. Job Specific Tools and Technologies
- 20. Professionalism
- 21. Reading and Writing

Proficient	Developing	Emerging
The student can work in a group to summarize the main points of a career in Data Collection and Analysis and explain the pros and cons of this career.	The student can explain some details relating to the Data Collection and Analysis career but is not able to provide detailed information or summarize learning.	The student cannot demonstrate their understanding of the Data Collection and Analysis career assigned to them.

7.13 Networking and the Internet

The student will outline the advantages and disadvantages of transmitting information over the Internet, including speed, reliability, cost, and security.



Curriculum Framework Summary

Students will explore various aspects of transmitting information over the internet including comparing the speed, cost and reliability of different types of data transmission media (physical or wireless media). Students will explain that while the internet allows for faster data transfer at a lower cost, transmission errors and unsecured channels can pose significant problems.

Prerequisite Knowledge

To engage with this standard, students must understand how devices transfer information through networks and the internet

Vocabulary

Term	Definition
Internet Speed	The rate at which data is communicated from the Internet to a computer and vice versa
Data Transmission	The process of transferring data between two or more digital devices
Internet	A global computer network consisting of multiple interconnected networks
IP Address	A numerical label assigned to each computing device on a network
Reliability	The ability of computers and the Internet to consistently perform to the expectations of their designed function

Integration Opportunities

Math 7.PS.2

Students will create a histogram representing the range of downloading speeds for different transmission media when sending a video or photo.

English 7.7 g, 7.9b

Students will collect, organize and synthesize (including evaluating for credibility) information from 3-5 sources regarding the speed, reliability, cost and security of various data transmission media to determine the advantages and disadvantages of each.

Summary of the Lesson

Students will create a comparison chart to research and compare various data transmission media (guide vs unguided) with columns for transmission speed, reliability, cost and possible security risks. Students will then select data examples (a video, document, audio file, etc) and determine which transmission media is the best option for sharing the data based on their research. At the end of the lesson, students will write a three sentence wrap-up describing the advantages and disadvantages of using the internet to transmit information.

Proficient	Developing	Emerging
The student can compare elements of various types of data transmission media and describe the advantages and disadvantages of transmitting information over the internet.	The student demonstrates their understanding the advantages and disadvantages of transmitting information over the internet but struggles with concepts of data transmission media.	The student cannot demonstrate their understanding of data transmission and transmission media.

7.14 Networking and the Internet

The students will explain why protocols are necessary in data transmission. Model the role of protocols in transmitting data across networks and the Internet.



Curriculum Framework Summary

In order for computers to communicate among networks all devices need to create and interpret packets. These packets are based on a universally agreed-upon set of rules. These rules are called protocols and allow all computing devices to send and receive messages using the same series of steps for every instance.

Prerequisite Knowledge

Students will have a working knowledge of data transmission and the speed of communication between computers. Students should also have a foundational understanding of different numeric values and symbols computers use to communicate.

Vocabulary

Term	Definition
Data Transmission	The process of transferring data between two or more digital devices
Protocol	The official procedure of a particular computing process
Network	A group of interconnected computers and other devices
Internet	A global computer network consisting of multiple interconnected networks

Summary of the Lesson

Students will participate in a communication activity using Morse code to demonstrate the importance of protocols. Each student will partner up and be given a page with the letters and their corresponding Morse code symbols. Each student will be given a series of short sentences to create in morse code. Without talking with one another students will then write the sentences into Morse code and then exchange with their partner and try to translate them using their page. The code has to be exact in order for the students to decode this issue. Students will then compare and contrast the use of a coding language to the protocols and packets needed for computers to speak. Students will then discuss other non-verbal forms of communication.

Integration Opportunities

Math 7.PFA.2

The student will use codebymath.com to evaluate algebraic expressions for given replacement values of the variables and compare/contrast the use of coding to solve an equation vs standard math input.

CTE Information Technology Career

Cluster: Digital Technologies and Computer Solutions #17 - Maintain working knowledge of current information technology (IT) systems.
- Students will simulate building a computer network by working through a series of challenges in groups.

ReS 1: 7-8c

Recognize non-verbal communication by using written Morse code to decode sentences.

Proficient	Developing	Emerging
The student is able to encode and decode Morse sentences and can explain how protocols impact how information is sent and received and why there are universal protocols in place.	The student is able to encode and decode Morse sentences, relates this to ways of sharing information, and can explain why there are universal protocols in place.	The student is able to encode and decode Morse sentences and can relate this to ways of sharing information.

7.15. Networking and the Internet

The student will model how information is broken down into smaller pieces, transmitted as packets through multiple devices over networks and the Internet, and reassembled at the destination



Curriculum Framework Summary

When we hit send on an email or send a picture to a friend we don't often think about how the internet works. When sending information from one computer to another, the data is broken down into smaller pieces, called packets. Packets enable the data to be sent efficiently. The packets are transmitted using routers within the network, the routers decide where to send each packet and check the sender's information. Once the packet reaches the destination the Transmission Control Protocol (TCP) checks that all the packets were received and reassembles the original data. Students will model the process of breaking a message into packets, reassembling the message and explain the purpose of a data packet.

Prerequisite Knowledge

To engage with this standard the student will have to draw on previous experience using the internet.

Vocabulary

Term	Definition
Data integrity	The preservation of accuracy and consistency of a data set over the course of its analysis
Data efficiency	The speed and resource usage involved in collecting, manipulating, and analyzing data
Constraints	A limit or restriction on a program or situation
Computer network	A series of interconnected computers and devices that share resources and exchange data with each other
Network	A group of interconnected computers and other devices

Summary of the Lesson

As a class watch a [video](#), explaining how the internet works. Students will then be broken into 6 groups. One group will simulate the job of routers and the other five groups will be senders/receivers. The sender and receiver groups will receive 4 envelopes, on the inside of each envelope there will be an index card with a number on the back of it. On the outside of the envelope, the following information will be listed, sender, receiver, packet number, a check box for router 1 and a check box for router 2 initials. The sender/receiver groups will put all the index cards in number order, then write a message on the index cards to send. Once the message is complete the group will place each index card back in each of the envelopes. The routers will have 3 minutes to transfer each individual packet to the senders. Two routers must initial a packet before it is given by the receiving group. Once all packets have been delivered, each group will reconstruct the message.

Integration Opportunities

Social Studies - USII 9b

Discuss the history of the internet and its impact on our lives. Break students into groups. Provide each group with a series of events (providing descriptions and pictures, no dates), that led to the internet as we know it today. Students must then work as a group to reconstruct the timeline accurately, using hints from the description of events and pictures.

Physical Education- 7.1b

Students engage in a "Hacker in the middle" game. Break students up in groups of 8. One student will serve as the sender, four students will serve as the routers, 2 will serve as the hackers and 1 student will be the receiver. As a group students must create a message to send. The students will then write the message on three beach balls (no more than one word on each ball). The ultimate goal is to get the message to the receiver, in a certain time frame without the hackers intercepting the message.

Proficient	Developing	Emerging
The student can model and explain the purpose of disassembling and assembling data packets.	The student can model the process but is unable to explain the purpose of disassembling and assembling packets.	The student is not able to demonstrate how to model a network or explain the purpose of disassembling and assembling packets.