The New York State K-12 Computer Science and Digital Fluency Standards Grades 4-6

Vision for the CS & DF Standards

Every student will know how to live productively and safely in a technology-dominated world. This includes understanding the essential features of digital technologies, why and how they work, and how to communicate and create using those technologies.

Computer Science and Digital Fluency Standards Concept Areas

Impacts of Computing	Computational Thinking	Networks and Systems Design	Cybersecurity	Digital Literacy

Links:

NYS K-12 Computer Science and Digital Fluency Standards (All Grades)

NYS K-12 Computer Science and Digital Fluency Standards (Grades 4-6)

Computer Science and Digital Fluency Standards Glossary of Terms

Impacts of Computing

Computing affects many aspects of the world at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions. In turn, computing influences new cultural practices. Informed citizens understand the ethical and social implications of the digital world, including equity and access to computing and computing technologies.

The Impacts of Computing Standards promote an understanding of the evolving impact of computing technologies on society through many lenses, including personal, social, cultural, accessibility, legal, economic, and ethical.

Impacts of Computing: Society

Standard	**4-6.IC.1** Describe computing technologies that have changed the world, and express how those technologies influence, and are influenced by, cultural practices.	
	Nouns	**Verbs**
	computing technology *world* *influence* *cultural practices*	*describe*
Clarifying Statement	The focus should be on how computing technologies both influence and are influenced by society and culture	
Focus Questions	*How has computing technology changed how we engage as a global society?* *How does computing technology influence culture?* *How does our culture influence the use of technology?* *How does computer technology impact the environment?* *Where do our computers go when we're done with them?* *Can you name some important computer technologies that have changed how we live, and how have they made life different?* *How does the culture you live in affect the way people use computers and other technology? Do you think this affects how technology is made?* *What are some examples of how technology, like computers or the internet, has changed the way people in different cultures communicate or learn?* *Have you noticed how things like social media or video calls have changed the way we connect with people? Do you think this is different in different countries or cultures?* *Why do you think some technology companies make products that work better for people in some countries or cultures than in others?* *Have you ever seen how technology is used to share stories, songs, or traditions from different cultures? How do you think this helps people understand each other better?* *Do you think everyone has the same access to computers and the internet? How does this affect the way people use technology in different places?* *Can you think of any rules or guidelines that people should follow when using technology to talk to others or share things online? Why are these important?* *How do you think learning about technology and its cultural impacts can help us become better digital citizens?* *Can you think of any ways technology could be used to solve problems in your community or help people from different backgrounds get along better?*	
Academic Language	*Computing technologies* *Information technology* *Internet*	*Artificial intelligence* *Machine learning* *Virtual reality*	*Internet of Things (IoT)* *computing technology* *influence*

	World Wide Web *Personal computers* *Smartphones* *Social media* *Globalization* *Augmented reality* *Robotics* *Cloud computing* *Big data* *Digital divide* *cultural practice* *Society* *Innovation*
NYSED Examples	Example 1: Students could discuss how technology, such as GPS systems, have influenced communication, relationships, travel, and the practices of cultural traditions and customs. (SOCIAL STUDIES) Example 2: Students could interview an older family member and ask how they were able to keep in touch with people that did not live close by and compare it to the way that students may communicate with someone that lives elsewhere. (SOCIAL STUDIES) Example 3: Have students visit webpages that translate into different languages and discuss how this can help people with an internet connection access information. (FOREIGN LANGUAGE) Example 4: Students could compare answers where one group only uses book resources and another group uses technology to answer questions. They can then discuss how technology changes their availability to information.
Interdisciplinary Connections	***Language Arts***: • ***Research and Writing***: *Investigating the history and impact of computing technologies (e.g., the internet, smartphones) through reading age-appropriate articles, books, and biographies of inventors and innovators.* • ***Digital Storytelling***: *Using multimedia tools (e.g., digital storytelling apps, presentation software) to create presentations or narratives that illustrate how computing technologies have transformed communication, entertainment, and daily life.* • ***Cultural Narratives***: *Exploring literature and folktales that reflect cultural perspectives on technology and its influence on traditions, values, and societal norms.* ***Mathematics***: • ***Data Analysis***: *Using spreadsheets or graphing tools to analyze statistical data on the adoption and impact of computing technologies (e.g., growth in internet users, sales of smartphones) worldwide.* • ***Problem-Solving***: *Engaging in math problems that explore the mathematical principles behind computing technologies, such as algorithms, binary code, and data encryption.*

- ***Mathematical Models***: *Studying mathematical models that simulate the spread and adoption rates of technological innovations across different cultures and regions.*

Science:

- ***Technology and Society***: *Investigating the scientific principles behind computing technologies (e.g., principles of electricity, semiconductor technology) and their applications in transforming industries and daily life.*
- ***Ethical Considerations***: *Discussing ethical dilemmas related to the development and use of computing technologies, such as data privacy, cybersecurity, and digital divide issues.*
- ***Environmental Impact***: *Exploring the environmental consequences of computing technologies, including energy consumption, electronic waste management, and sustainability initiatives in technology design.*

Social Studies/ Civics:

- ***Global Perspectives***: *Studying the global impact of computing technologies on economies, politics, and cultural exchange, analyzing case studies of countries that have adopted technology-driven development strategies.*
- ***Digital Citizenship***: *Learning about rights and responsibilities in the digital age, discussing cultural differences in online behavior, digital etiquette, and laws governing internet use.*
- ***Cultural Heritage***: *Investigating how computing technologies are used to preserve and promote cultural heritage through digital archives, virtual museums, and online educational resources.*

Digital Literacy/ Technology Education:

- ***Digital Tools***: *Exploring various computing technologies (e.g., social media platforms, educational apps, virtual reality) and their functionalities in enhancing learning, communication, and creativity.*
- ***Programming and Coding***: *Introducing basic programming concepts (e.g., coding languages, algorithms) and discussing how coding skills empower individuals to create and innovate with computing technologies.*
- ***Innovation and Entrepreneurship***: *Studying examples of young innovators and entrepreneurs who have utilized computing technologies to launch startups and initiatives that address societal challenges and cultural needs.*

Art:

	• ***Digital Art and Expression***: *Creating digital artworks that reflect the integration of computing technologies in contemporary art forms, such as digital painting, interactive installations, and multimedia art projects.* • ***Design Thinking***: *Using design thinking principles to ideate and prototype creative solutions that leverage computing technologies to address cultural issues and promote social change.* • ***Visual Culture***: *Analyzing digital art movements and trends influenced by computing technologies, exploring how artists use technology to explore identity, cultural diversity, and social justice themes.* ***Health Education***: • ***Telehealth and Digital Medicine***: *Exploring the impact of computing technologies on healthcare delivery, discussing telemedicine, health monitoring apps, and digital platforms for patient education and remote consultations.* • ***Digital Wellness***: *Discussing the role of computing technologies in promoting mental health and well-being, including mindfulness apps, digital detox practices, and strategies for managing screen time.* • ***Health Information***: *Learning about the importance of accurate health information online, discussing how computing technologies facilitate access to medical research, health resources, and online support communities.* ***Physical Education***: • ***Fitness Technology***: *Exploring the use of computing technologies in fitness tracking, sports analytics, and virtual training programs, discussing how technology enhances athletic performance, coaching, and physical fitness.* • ***E-Sports and Gaming Culture***: *Analyzing the cultural impact of e-sports and online gaming communities, discussing how computing technologies have transformed leisure activities and social interactions among young people.* • ***Digital Sportsmanship***: *Promoting ethical behavior and sportsmanship in digital environments, discussing fair play, respect, and teamwork in online gaming and virtual sports competitions.*
Additional Examples and Resources	*Students can write a journal entry about living a day without technology* *Students can interview their parents about how their parents lives without computing technology are different than their own lives today* *https://thriveglobal.com/stories/living-in-a-society-without-technology/*

	***Code.org**: Code.org offers a variety of free resources for teaching computer science concepts to elementary students, including lessons on the cultural impact of technology. Teachers can access interactive activities, videos, and coding challenges that introduce students to the role of technology in society.* ***BrainPOP**: BrainPOP provides educational videos, games, and quizzes on a wide range of topics, including technology and culture. Teachers can use BrainPOP's resources to facilitate classroom discussions and reinforce key concepts related to the cultural impact of computing technologies.* ***Google's "Be Internet Awesome"**: Google's "Be Internet Awesome" program offers a curriculum and resources for teaching digital citizenship skills to elementary students, including lessons on the cultural implications of technology. Teachers can use these materials to help students develop a deeper understanding of how technology influences society and culture.* ***Scratch**: Scratch is a free programming platform developed by MIT that allows students to create interactive stories, animations, and games. Teachers can use Scratch to engage students in hands-on coding activities that explore the cultural impact of computing technologies and encourage creativity and expression.* ***Common Sense Education**: Common Sense Education provides a variety of resources for teaching digital literacy and citizenship skills to elementary students, including lessons on the cultural impact of technology. Teachers can access lesson plans, videos, and interactive activities that help students understand how technology shapes our lives and relationships.*

Impacts of Computing: Society

Standard	**4-6.IC.2** Explain how laws impact the use of computing technologies and digital information.	
	Nouns	**Verbs**
	laws	*explain*
Clarifying Statement	The focus is on how laws regulate the use of computing technologies and what might happen if those laws did not exist.	
Focus Questions	*Why do we have laws?* *Why do we need to develop laws that never existed before?* *Why would we need laws for computing technologies?* *Why do you think there are laws that regulate the use of computing technologies and digital information?* *Can you give examples of laws that affect how people use technology and share information online?* *How do these laws help protect people's privacy and safety when using computers and the internet?* *What might happen if there were no laws regulating the use of computing technologies and digital information?* *How do laws about intellectual property rights, such as copyrights and trademarks, impact the way people create and share content online?* *What responsibilities do you think people have when using technology, and how do laws help enforce those responsibilities?* *How do laws about online behavior, such as cyberbullying and harassment, help create a safer and more respectful online environment?* *Can you think of any recent examples where laws related to technology and digital information have changed or been updated? How do these changes affect people's lives?* *What role do you think governments and lawmakers play in regulating technology and digital information, and how can individuals and communities advocate for laws that reflect their values and concerns?* *How can learning about laws related to computing technologies and digital information help you become a responsible and ethical digital citizen?*	
Academic Language	*Computing technologies* *Digital information* *Laws* *Regulations* *Legislation* *Copyright* *Digital rights*	*Patent* *Trademark* *Intellectual property* *Data protection laws* *Privacy laws* *Cybersecurity laws* *Internet regulations*	*Electronic Communications Privacy Act (ECPA)* *General Data Protection Regulation (GDPR)* *Children's Online Privacy Protection Act (COPPA)*

NYSED Examples	Example 1: Students could identify how government regulation of the internet affects people's access to information. (SOCIAL STUDIES) Example 2: Students could identify laws at the state level and at the national level that address cybersecurity threats. (SOCIAL STUDIES) Example 3: Students could identify commissions that study and provide guidance on laws related to computing technologies. (SOCIAL STUDIES) Example 4: Help students to understand the laws about digital information and identify what are considered illegal postings, such as threatening others.
Interdisciplinary Connections	***Language Arts***: • ***Legal Writing***: *Exploring the language and structure of laws related to digital information and technology, including privacy policies, terms of service agreements, and copyright laws.* • ***Debates and Discussions***: *Engaging in debates or discussions about the ethical implications of digital laws, such as online privacy rights, cybersecurity regulations, and intellectual property protections.* • ***Reading Comprehension***: *Reading age-appropriate articles or case studies that illustrate real-life examples of legal issues related to computing technologies, discussing the impact of laws on digital innovation and consumer rights.* ***Mathematics***: • ***Data Privacy and Encryption***: *Learning about mathematical concepts behind data encryption algorithms used to protect digital information, understanding how encryption methods comply with legal requirements for data security.* • ***Statistics and Compliance***: *Analyzing statistical data on legal compliance with digital privacy laws and cybersecurity regulations, discussing the role of mathematics in measuring compliance and assessing risks.* • ***Problem-Solving Scenarios***: *Using math problems to explore scenarios where legal considerations impact technological decisions, such as calculating data breach costs or assessing legal penalties for non-compliance.* ***Social Studies/ Civics***: • ***Civic Responsibilities***: *Studying the rights and responsibilities of digital citizens under the law, discussing how laws protect individuals from cyberbullying, identity theft, and online fraud.* • ***Government and Policy***: *Learning about the role of government agencies (e.g., FTC, FCC) in regulating digital technologies, discussing*

how legislative processes influence the development and enforcement of digital laws.

- ***Historical Perspectives**: Investigating historical events that shaped digital laws and regulations, such as landmark court cases involving digital privacy rights and intellectual property disputes.*

***Digital Literacy/ Technology Education**:*

- ***Ethical Coding Practices**: Exploring ethical considerations in computer programming and software development, discussing how coding practices align with legal requirements for data protection and cybersecurity.*
- ***Digital Citizenship**: Learning about digital rights and responsibilities, including safe online behavior, respect for intellectual property, and ethical use of digital resources in compliance with legal standards.*
- ***Cybersecurity Awareness**: Discussing the importance of cybersecurity measures (e.g., firewalls, antivirus software) in protecting personal and organizational data, understanding legal implications of data breaches and security incidents.*

***Science**:*

- ***Data Security and Privacy**: Exploring scientific principles behind data encryption, secure networks, and data storage technologies, discussing how scientific research contributes to advancements in digital security and compliance with legal standards.*
- ***Emerging Technologies**: Studying ethical implications of emerging technologies (e.g., artificial intelligence, biometrics) in relation to digital laws and regulations, discussing ethical frameworks for responsible technology use.*
- ***Environmental Impact**: Investigating environmental consequences of digital technologies and data storage practices regulated by legal standards, discussing sustainability measures and regulatory compliance in technology industries.*

***Art**:*

- ***Digital Art and Ethics**: Creating digital artworks that explore ethical dilemmas related to digital information and technology use, such as online privacy, surveillance, and censorship, discussing how artistic expression can provoke discussions on legal and ethical issues.*
- ***Visual Representation**: Using graphic design tools to visually represent legal concepts related to digital rights and responsibilities, creating infographics or posters that educate peers about digital laws and regulations.*

	• ***Interactive Installations***: *Designing interactive digital art installations that simulate legal scenarios involving digital technologies, encouraging viewers to reflect on the impact of laws on technology use and innovation.* ***Health Education***: • ***Digital Wellness and Legal Rights***: *Discussing legal rights related to health information privacy (e.g., HIPAA regulations), exploring how digital technologies comply with laws protecting patient confidentiality and data security.* • ***Telehealth and Regulation***: *Learning about legal considerations in telemedicine and digital healthcare services, discussing regulations governing online consultations, electronic health records, and patient consent.* • ***Ethical Decision-Making***: *Analyzing ethical dilemmas in digital healthcare delivery, discussing legal frameworks that balance patient rights, public health interests, and technological innovation.* ***Physical Education***: • ***Digital Fitness and Privacy***: *Discussing legal implications of fitness tracking technologies and health apps, exploring privacy concerns related to data collection, storage, and sharing of personal health information.* • ***Sportsmanship and Online Conduct***: *Exploring legal aspects of online gaming and virtual sports competitions, discussing fair play, responsibility, and ethical behavior in digital sports environments.* • ***Digital Coaching and Compliance***: *Learning about legal considerations in coaching and sports management apps, discussing regulations governing athlete data protection, performance analytics, and digital sports training tools.*
Additional Examples and Resources	

Impacts of Computing: Ethics

Standard	**4-6.IC.3** Explain current events that involve computing technologies.	
	Nouns	**Verbs**
	current events *computing technologies*	*explain*
Clarifying Statement	Explanations should be grade level appropriate to ensure understanding of current events and the related computing technologies.	
Focus Questions	*What current events involve computing technologies?* *How do computing technologies affect current events in both positive and negative ways?*	
Academic Language	*Current events* *Computing technologies* *Artificial intelligence (AI)* *Machine learning* *Data breaches* *Cybersecurity attacks* *Emerging technologies* *Internet censorship* *Social media controversies* *Privacy concerns* *Ethical dilemmas in technology* *Tech company scandals* *Tech company scandals* *Robotics advancements* *Internet of Things (IoT) innovations* *Cryptocurrency developments*	
NYSED Examples	Example 1: Students might read an informational text about an interdisciplinary topic and be able to explain the connection with computing technologies that were presented in the text. (ELA) Example 2: Students can post to a discussion board about a current event or technology trend. (SOCIAL STUDIES) Example 3: Students can create digital artifacts about a new technology that they explored.	
Interdisciplinary Connections	***Language Arts***: • ***News Analysis***: *Reading age-appropriate news articles or summaries about current events involving computing technologies (e.g., advancements in artificial intelligence, data breaches, social media controversies).* • ***Writing Reports***: *Writing short reports or summaries on current events related to computing technologies, summarizing key points, discussing implications, and reflecting on personal opinions.* • ***Debates and Discussions***: *Participating in class debates or discussions about ethical dilemmas or societal impacts of recent technological developments, practicing respectful dialogue and critical thinking skills.*	

Mathematics:

- ***Data Analysis***: *Analyzing statistical data related to current events in computing technologies (e.g., cybersecurity incidents, adoption rates of new technologies), using graphs and charts to visualize trends and patterns.*
- ***Problem-Solving Scenarios***: *Solving math problems based on real-life scenarios involving computing technologies, such as calculating the economic impact of a cyberattack or assessing data privacy risks.*

Social Studies/ Civics:

- ***Government and Policy***: *Learning about government policies and regulations that affect computing technologies, discussing how lawmakers and regulatory agencies respond to current events (e.g., privacy laws, antitrust investigations).*
- ***Global Perspectives***: *Investigating global reactions to technological advancements and controversies, exploring cultural differences in attitudes towards digital privacy, surveillance, and innovation.*
- ***Historical Context***: *Studying historical events that have shaped computing technologies and their societal impacts, comparing past technological revolutions with contemporary developments.*

Digital Literacy/ Technology Education:

- ***Ethical Discussions***: *Discussing ethical considerations related to current events in computing technologies, such as algorithm bias, digital divide, and misinformation online.*
- ***Digital Citizenship***: *Learning about responsible online behavior and digital rights in the context of current technological issues, discussing strategies for safe and respectful digital engagement.*
- ***Emerging Technologies***: *Exploring emerging technologies featured in current events (e.g., blockchain, augmented reality), discussing their potential applications and ethical implications.*

Science:

- ***Technological Advancements***: *Studying scientific principles behind recent technological breakthroughs (e.g., quantum computing, biotechnology), discussing how scientific research drives innovation in computing technologies.*
- ***Environmental Impact***: *Investigating the environmental footprint of computing technologies featured in current events, discussing sustainability challenges and technological solutions.*

	• ***Health and Safety**: Learning about health implications of new technologies (e.g., wearable devices, telemedicine), discussing benefits and risks associated with their adoption.* ***Art**:* • ***Digital Art Reflection**: Creating artworks or multimedia projects that reflect themes from current events in computing technologies, expressing personal interpretations and perspectives through visual or digital media.* • ***Visual Representation**: Using graphic design tools to create infographics or visual presentations that explain complex technological concepts or illustrate data related to current events.* • ***Interactive Installations**: Designing interactive digital art installations that engage viewers in discussions about ethical dilemmas or societal impacts of computing technologies.* ***Health Education**:* • ***Digital Wellness**: Discussing the impact of computing technologies on mental health and well-being, exploring strategies for maintaining a healthy balance between online and offline activities.* • ***Cybersecurity Awareness**: Learning about cybersecurity risks featured in current events (e.g., phishing scams, data breaches), discussing preventive measures and responsible digital behavior.* • ***Ethical Decision-Making**: Analyzing ethical dilemmas in digital healthcare, discussing privacy concerns, patient rights, and ethical standards in the use of health-related technologies.* ***Physical Education**:* • ***Fitness Technology**: Exploring the role of computing technologies in fitness tracking, discussing benefits and privacy considerations of health apps and wearable devices.* • ***Sportsmanship and Online Conduct**: Discussing ethical behavior in online gaming and virtual sports competitions, exploring fairness, respect, and responsible digital sportsmanship.* • ***Digital Coaching**: Learning about coaching and training technologies used in sports, discussing data privacy, performance analytics, and ethical considerations in digital sports coaching.*
Additional Examples and Resources	*-Have students identify how "credible sources" is important in our society (fake news vs. real information)* *-Use Scholastic News/current events (includes topics in technology)* *-Research military technologies that are aiding in current events worldwide*

	-Using a time period, determine a computing technology that had a major impact on that event and list its pros/cons or write an informative piece as to how that event would have been different without that computing technology

Impacts of Computing: Ethics

Standard	**4-6.IC.4** Explain who has access to data in different digital spaces.	
	Nouns	**Verbs**
	data *digital spaces*	*explain*
Clarifying Statement	The focus is on identifying different groups who might have access to data stored or posted in different places, including companies.	
Focus Questions	*How might different groups who have access to data post in different places?* *Who has access to different digital data?* *What should I do if someone accesses my data?* *Is my data/information safe on this website?* *How do I keep my information secure?*	
Academic Language	*Data access* *Digital spaces* *User permissions* *User roles* *Authentication*	*Authorization* *User accounts* *Privacy settings* *Data ownership* *Data sharing*	*Public data* *Private data* *Encryption* *Data security* *Access control*
NYSED Examples	Example 1: Students could explain that things posted to online accounts can be accessed by “friends” and “strangers” that they share data with. Example 2: Talk about posting things on social media. What things do they need to keep private? What settings should be turned on? Example 3: Students could create a contract with their parents about what is ok and not ok to post publicly.	
Interdisciplinary Connections	***Language Arts***: • ***Digital Literacy***: *Reading age-appropriate articles or stories that discuss digital privacy, data security, and online safety, analyzing how different individuals and organizations access and use data in digital spaces.* • ***Writing Skills***: *Writing short essays or reflections on the importance of protecting personal data online, discussing who should have access to digital information and why privacy matters in digital environments.* • ***Media Analysis***: *Analyzing digital media (e.g., advertisements, social media posts) to identify how personal data is collected and used by different entities, discussing ethical considerations in digital advertising and data collection practices.* ***Mathematics***:	

- ***Data Privacy***: *Learning about mathematical concepts related to data encryption and secure data transmission, discussing how encryption methods protect data from unauthorized access in digital spaces.*
- ***Statistics***: *Analyzing statistical data on data breaches and cybersecurity incidents, understanding how data vulnerabilities impact individuals' privacy and security in digital environments.*
- ***Probability and Risk***: *Discussing probabilities of data exposure and risks associated with sharing personal information online, calculating risks and making informed decisions about online behavior.*

Social Studies/ Civics:

- ***Digital Citizenship***: *Exploring rights and responsibilities in digital environments, discussing laws and regulations that govern data privacy, cybersecurity, and online safety.*
- ***Government and Policy***: *Learning about government agencies and international organizations that regulate data protection and privacy laws, discussing their role in safeguarding individuals' digital rights.*
- ***Global Perspectives***: *Investigating cultural differences in attitudes towards digital privacy and data sharing practices, discussing how cultural norms influence data access and use in different regions.*

Digital Literacy/ Technology Education:

- ***Ethical Discussions***: *Engaging in discussions about ethical dilemmas related to data access and privacy, exploring scenarios where personal data is shared or accessed without consent.*
- ***Digital Footprint***: *Learning about digital footprints and their impact on personal privacy, discussing strategies for managing and minimizing digital traces in online activities.*
- ***Security Awareness***: *Exploring cybersecurity measures (e.g., passwords, two-factor authentication) that protect data from unauthorized access in digital spaces, discussing best practices for online security.*

Science:

- ***Technology and Society***: *Studying scientific principles behind data storage, transmission, and encryption technologies, discussing how scientific research contributes to advancements in digital security and privacy.*
- ***Ethical Considerations***: *Analyzing ethical implications of data access and use in scientific research, discussing principles of data ethics and responsible data management practices.*

	• ***Environmental Impact****: Investigating environmental consequences of data storage technologies and digital infrastructure, discussing sustainability challenges and innovations in data center management.* ***Art****:* • ***Visual Representation****: Creating visual artworks or digital posters that illustrate concepts of digital privacy and data access, expressing personal perspectives on the importance of protecting digital information.* • ***Interactive Media****: Designing interactive digital media projects that simulate scenarios of data access and privacy, encouraging peers to reflect on ethical considerations in digital interactions.* • ***Digital Storytelling****: Using digital storytelling tools to create narratives or animations that explore themes of data security and privacy, fostering empathy and awareness of digital rights.* ***Health Education****:* • ***Digital Wellness****: Discussing the impact of digital technologies on mental health and well-being, exploring strategies for maintaining a healthy balance between online activities and personal privacy.* • ***Cybersecurity Awareness****: Learning about risks associated with sharing personal health information online, discussing privacy protections and ethical considerations in digital healthcare.* • ***Health Information Literacy****: Analyzing sources of health information online, discussing reliability, privacy policies, and ethical implications of sharing health-related data in digital spaces.* ***Physical Education****:* • ***Fitness Technology****: Exploring the role of digital fitness trackers and health apps in collecting and managing personal health data, discussing privacy concerns and ethical use of fitness technology.* • ***Sportsmanship and Online Conduct****: Discussing ethical behavior in online gaming and virtual sports competitions, exploring fairness, respect, and responsible digital sportsmanship in digital environments.* • ***Digital Coaching****: Learning about coaching and training technologies used in sports, discussing data privacy, performance analytics, and ethical considerations in digital sports coaching.*
Additional Examples and Resources	*-Students could work through an interactive slide deck and select specific pieces of information that are okay to share on the internet and what is not okay.* *-Show videos from news sites where people have shown how easy it is to access information that others think are private.*

	-Compare different examples of what is okay to post and what isn't and explain why it is or isn't. *-Create a chart of various problem solving strategies for if your data is accessed as well as creating a handout of ways to safe & secure on the internet (i.e. not choosing simple passwords, etc.)* *-Talk about anything you post, is left in the internet world, even though you delete it.*

Impacts of Computing: Ethics

Standard	**4-6.IC.5** Explain how computer systems play a role in human decision-making.	
	Nouns	**Verbs**
	computer systems *humans*	*explain*
Clarifying Statement	The focus is on explaining a range of ways that humans interact with AI to make decisions.	
Focus Questions	*What is AI?* *What computer systems play a role in our decision making?*	
Academic Language	*Computer systems* *Decision-making* *Algorithms* *Artificial intelligence (AI)* *Machine learning* *Neural networks* *Data analysis* *Data processing* *Predictive analytics* *Automation* *Expert systems* *User interfaces* *Decision support systems* *Human-computer interaction* *Ethical implications*	
NYSED Examples	Example 1: Students could discuss how recommendation algorithms influence what people select on video and music websites and applications. Example 2: Students could discuss AI that is designed to help professionals make decisions like algorithms that help doctors diagnose patients or that help judges decide on sentencing. Example 3: Students can create basic chat bots based on simple questions and then discuss how these can have real life uses. Example 4: Have students use a maps program or GPS to give different route options and then can pick which one to go based on a set of criteria (avoid tolls, highways, fastest, etc.). (SOCIAL STUDIES)	
Interdisciplinary Connections	***Language Arts***: • ***Reading Comprehension***: *Reading age-appropriate stories or articles about how computer systems assist in decision-making processes across different fields (e.g., healthcare, transportation, education).* • ***Writing***: *Writing short essays or narratives that explore scenarios where computer systems help individuals or organizations make decisions more effectively, reflecting on the advantages and ethical considerations.* • ***Debates and Discussions***: *Engaging in debates or discussions about the impact of automated decision-making systems on society, discussing ethical dilemmas and potential biases in algorithms.* ***Mathematics***:	

- ***Data Analysis***: *Using basic statistical concepts to understand how computer systems analyze data to support decision-making, discussing how algorithms process information to generate insights or predictions.*
- ***Probability and Prediction***: *Exploring how computer models use probabilities and predictions to assist in decision-making processes, discussing examples like weather forecasting or sports analytics.*
- ***Problem-Solving Scenarios***: *Solving math problems that simulate decision-making processes aided by computer systems, analyzing outcomes based on different variables and inputs.*

Social Studies/ Civics:

- ***Government and Policy***: *Learning about government policies and regulations related to the use of artificial intelligence (AI) and computer systems in decision-making, discussing ethical guidelines and legal frameworks.*
- ***Global Perspectives***: *Investigating international perspectives on the role of AI and automation in decision-making, discussing cultural differences and societal impacts of technology adoption.*
- ***Historical Context***: *Studying historical developments in computing and automation, exploring how advancements in technology have influenced decision-making processes over time.*

Digital Literacy/ Technology Education:

- ***Ethical Discussions***: *Engaging in discussions about ethical considerations in using AI and computer systems for decision-making, exploring topics such as privacy, bias, transparency, and accountability.*
- ***Digital Citizenship***: *Learning about rights and responsibilities in the digital age, discussing how individuals can critically evaluate information and decisions made by computer systems.*
- ***Emerging Technologies***: *Exploring emerging technologies like machine learning and robotics, discussing their potential impact on future decision-making processes in various sectors.*

Science:

- ***Technology and Society***: *Studying scientific principles behind computer systems and AI algorithms, discussing how scientific research contributes to advancements in decision-making technology.*
- ***Ethical Considerations***: *Analyzing ethical implications of using AI in healthcare diagnostics, autonomous vehicles, and other decision-making applications, discussing safety, reliability, and human oversight.*

	• ***Environmental Impact**: Investigating environmental consequences of technological advancements in computing and automation, discussing sustainability challenges and innovations.* ***Art**:* • ***Visual Representation**: Creating visual artworks or digital projects that depict scenarios where computer systems aid decision-making, expressing personal interpretations and reflections on technology's role in society.* • ***Interactive Media**: Designing interactive media projects that simulate decision-making processes assisted by computer systems, exploring ethical dilemmas and consequences of automated decisions.* • ***Digital Storytelling**: Using digital storytelling tools to create narratives or animations that illustrate how AI and computer systems impact decision-making in different contexts, fostering empathy and understanding of technology's role.* ***Health Education**:* • ***Digital Wellness**: Discussing the impact of AI and computer systems on mental health and well-being, exploring benefits and risks of using technology to support healthcare decisions.* • ***Ethical Healthcare**: Learning about ethical guidelines in medical decision-making assisted by AI, discussing patient rights, consent, and the importance of human judgment in healthcare settings.* • ***Health Information Literacy**: Analyzing sources of health information generated by computer systems, discussing reliability, privacy concerns, and ethical considerations in digital healthcare.* ***Physical Education**:* • ***Fitness Technology**: Exploring how computer systems and wearable devices assist athletes and coaches in making training and performance decisions, discussing ethical use of data in sports analytics.* • ***Sportsmanship and Online Conduct**: Discussing ethical behavior in online gaming and virtual sports competitions, exploring fairness, respect, and responsible digital sportsmanship influenced by technology.* • ***Digital Coaching**: Learning about coaching technologies used in sports, discussing data privacy, performance analytics, and ethical considerations in digital sports coaching.*
Additional Examples and Resources	*Students could work with coding to understand how algorithms work*

Impacts of Computing: Ethics

Impacts of Computing: Accessibility

<table>
<tr><td rowspan="3">Standard</td><td colspan="2">4-6.IC.6 Identify and explain ways to improve the accessibility and usability of a computing device or software application for the diverse needs and wants of users.</td></tr>
<tr><td>Nouns</td><td>Verbs</td></tr>
<tr><td>computing device,
software application
users</td><td>identify
explain</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">The focus is on identifying the needs and wants of diverse end users and purposefully considering potential perspectives of users with different backgrounds, ability levels, points of view, and abilities.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">What makes a computing device more accessible for individuals?
What features do you use to make using the computer easier?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Accessibility
Usability
User interface (UI)
User experience (UX)
Assistive technology
Adaptive technology
Inclusive design
User-centered design
Universal design
Accessibility features
Keyboard shortcuts
Screen readers
Voice recognition
Color contrast
Font size and style options
Text to speech
Dynovox</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students could use both text and speech when they create and convey information in a game that they program. Students might make recommendations for making an app easier to navigate.
Example 2: Analyze specific classroom applications from the perspective of different disabilities and offer suggestions.</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Language Arts:
• Instructional Writing: Writing step-by-step instructions or user guides on how to adjust settings for accessibility features on devices or software applications, using clear language and visual aids.
• Persuasive Writing: Creating persuasive posters or essays advocating for the inclusion of accessibility features in digital tools, discussing the importance of accommodating diverse user needs.
• Reading Comprehension: Reading articles or stories about individuals with disabilities using technology, discussing how accessibility features enhance their experiences and independence.

Mathematics:</td></tr>
</table>

- ***Data Analysis***: *Analyzing statistical data on the prevalence of different types of disabilities and their impact on technology use, discussing how data informs the development of accessible features.*
- ***Measurement and Design***: *Measuring usability metrics (e.g., ease of navigation, readability) of digital tools with and without accessibility features, discussing improvements based on user feedback and testing.*
- ***Problem-Solving Scenarios***: *Solving math problems that simulate scenarios where users with different abilities interact with technology, discussing strategies to enhance accessibility and usability.*

Social Studies/ Civics:

- ***Digital Citizenship***: *Learning about digital rights and responsibilities, discussing how accessibility features promote inclusivity and respect for diverse user needs in digital environments.*
- ***Advocacy and Activism***: *Studying historical and contemporary advocates for disability rights in technology, discussing their impact on policy changes and technological advancements.*
- ***Government and Policy***: *Exploring laws and regulations (e.g., ADA in the US) that mandate accessibility standards for technology, discussing compliance and ethical considerations.*

Digital Literacy/ Technology Education:

- ***User Experience (UX) Design***: *Learning about principles of UX design and how they apply to accessibility, discussing strategies such as user personas, empathy mapping, and usability testing.*
- ***Ethical Discussions***: *Engaging in discussions about ethical considerations in designing accessible technology, exploring topics such as privacy, dignity, and the right to access information.*
- ***Emerging Technologies***: *Exploring how emerging technologies (e.g., voice recognition, gesture control) can enhance accessibility, discussing their potential benefits and challenges in diverse user contexts.*

Science:

- ***Human Anatomy and Physiology***: *Studying how different disabilities affect motor skills, vision, hearing, and cognitive abilities, discussing technological solutions that address these challenges.*
- ***Engineering and Technology***: *Exploring engineering principles behind assistive technologies (e.g., prosthetics, screen readers), discussing innovations that improve accessibility in everyday life.*
- ***Health and Safety***: *Learning about ergonomic design principles and safety considerations in developing accessible technology, discussing user-centered approaches to prevent discomfort and injury.*

	***Art**:* • ***Visual Representation**: Creating visual artworks that depict scenarios of inclusive technology use, illustrating how accessible features benefit users with diverse abilities.* • ***Interactive Media**: Designing interactive media projects that simulate experiences of navigating digital tools with and without accessibility features, fostering empathy and understanding among peers.* • ***Digital Storytelling**: Using digital storytelling tools to create narratives or animations that highlight the importance of accessibility in technology, promoting awareness and advocacy for inclusive design.* ***Health Education**:* • ***Digital Wellness**: Discussing how accessible technology promotes mental and emotional well-being among users with disabilities, exploring the role of technology in fostering independence and inclusion.* • ***Ethical Healthcare**: Learning about ethical considerations in providing accessible healthcare information and services online, discussing privacy, consent, and dignity in digital interactions.* • ***Health Information Literacy**: Analyzing digital health resources and tools for accessibility features, discussing strategies to improve accessibility in health-related technology.* ***Physical Education**:* • ***Fitness Technology**: Exploring how wearable fitness devices accommodate users with disabilities, discussing accessibility features that promote active lifestyles and personalized fitness goals.* • ***Sportsmanship and Inclusion**: Discussing ethical considerations in adaptive sports technology, exploring how technology enhances participation and enjoyment for athletes with disabilities.* • ***Digital Coaching**: Learning about coaching technologies that support athletes with diverse needs, discussing accessibility features and data privacy considerations in digital sports coaching.*
Additional Examples and Resources	*Practice using speech-text to write a paragraph and using text-speech to revise it*

Impacts of Computing: Career Paths

Standard	**4-6.IC.7** Identify a diverse range of role models in computer science.	
	Nouns	**Verbs**
	range *role model*	*identify*
Clarifying Statement	The emphasis of this standard is the opportunity to personally identify with a range of diverse people in the field of computer science.	
Focus Questions	*How does culture affect career paths?* *What careers are focused in computer science?* *How does computer science impact careers outside of the CS field?*	
Academic Language	*Role models* *Computer science pioneers* *Innovators* *Trailblazers* *Leaders* *Tech entrepreneurs* *Influencers* *Women in computing* *Minorities in computing* *Diversity in tech* *Representation in STEM* *Community leaders* *Open-source contributors* *Educators in computer science* *Advocates for diversity and inclusion*	
NYSED Examples	Example 1: A teacher might provide leveled articles for students to read about people in computer science that reflect diversity in race/ethnicity, gender, disability, sexual orientation, and other characteristics. (ELA) Example 2: A teacher could invite experts from various fields to video chat or visit the classroom to showcase what they do and allow students to ask questions. Example 3: Have students watch a video on diverse fields in computer science. Example 4: Students could research historical figures in Computer Science and computer device history. (SOCIAL STUDIES)	
Interdisciplinary Connections	***Language Arts***: • ***Biographical Reading***: *Reading age-appropriate biographies or short profiles of diverse individuals in computer science, discussing their contributions, challenges overcome, and impact on technology.* • ***Research and Writing***: *Conducting research on different role models in computer science, writing reports or essays that highlight their achievements, innovations, and lasting influence.* • ***Creative Writing***: *Writing narratives or stories that imagine the experiences and innovations of diverse computer scientists, encouraging imagination and understanding of their impact.*	

Mathematics:

- ***Problem-Solving Skills***: *Studying the mathematical principles behind inventions and innovations by role models in computer science (e.g., algorithms, cryptography), discussing their applications and significance.*
- ***Data Analysis***: *Analyzing statistical data on diversity in STEM fields, discussing challenges and opportunities for underrepresented groups in pursuing careers in computer science.*
- ***Graphical Representation***: *Creating graphs or charts that illustrate the representation of diverse role models in computer science over time, exploring trends and barriers.*

Social Studies/ Civics:

- ***History of Technology***: *Learning about historical figures and diverse communities that contributed to the development of computer science and technology, discussing their impact on society.*
- ***Global Perspectives***: *Studying computer scientists from different countries and cultures, discussing how cultural diversity influences innovation and problem-solving in technology.*
- ***Advocacy and Activism***: *Exploring the role of advocacy groups and organizations that promote diversity and inclusion in STEM fields, discussing strategies for increasing representation.*

Digital Literacy/ Technology Education:

- ***Exploring Technology***: *Investigating how role models in computer science have influenced the development of digital tools and technologies, discussing their innovative approaches.*
- ***Ethical Discussions***: *Engaging in discussions about ethical considerations in technology development and use, exploring how diverse perspectives contribute to ethical decision-making.*
- ***Emerging Technologies***: *Exploring emerging technologies (e.g., AI, cybersecurity) and the role diverse voices play in shaping the future of these fields, discussing opportunities and challenges.*

Science:

- ***Scientific Principles***: *Studying scientific principles behind inventions and discoveries by diverse computer scientists, discussing their impact on technology and everyday life.*
- ***Health and Technology***: *Exploring how computer science intersects with health and medical fields, discussing innovations in medical technology and the diverse researchers involved.*

	• ***Environmental Impact**: Investigating sustainable practices and technologies developed by diverse computer scientists, discussing their contributions to environmental conservation and sustainability.* ***Art**:* • ***Visual Representation**: Creating artworks or digital projects that depict diverse role models in computer science, celebrating their achievements and contributions to technology.* • ***Interactive Media**: Designing interactive media projects that showcase the stories and innovations of diverse computer scientists, encouraging engagement and exploration.* • ***Digital Storytelling**: Using digital storytelling tools to create narratives or animations that highlight the journeys and impacts of diverse role models in computer science, fostering empathy and understanding.* ***Health Education**:* • ***Digital Wellness**: Discussing the impact of digital technology on mental health and well-being, exploring how diverse perspectives in computer science can contribute to designing inclusive and supportive technologies.* • ***Ethical Healthcare**: Learning about ethical considerations in digital health technologies developed by diverse computer scientists, discussing privacy, consent, and accessibility.* • ***Health Information Literacy**: Analyzing health information technologies created by diverse role models in computer science, discussing their role in improving healthcare accessibility and outcomes.* ***Physical Education**:* • ***Fitness Technology**: Exploring how computer science innovations in fitness technology support diverse users, discussing accessibility features and inclusivity in digital fitness tools.* • ***Sportsmanship and Inclusion**: Discussing ethical considerations in sports technology developed by diverse computer scientists, exploring how technology enhances inclusivity and participation.* • ***Digital Coaching**: Learning about coaching technologies that support athletes of diverse abilities, discussing accessibility features and ethical considerations in digital sports coaching.*
Additional Examples and Resources	https://www.topuniversities.com/courses/computer-science-information-systems/10-amazing-female-computer-scientists-youve-probably-never-heard

	https://news.gallup.com/poll/355070/role-models-spark-students-interest-computer-science.aspx https://www.accreditedschoolsonline.org/resources/women-computer-tech-role-models/

Computational Thinking

Computational thinking involves thinking about and solving problems in ways that can be carried out by a computer. Computational thinking not only underpins all theory and application of computer science, but also influences many other subject areas. Computational thinking includes both core concepts, such as algorithms and variables, and core practices, such as abstraction, decomposition, data analysis, modeling, and simulation, that are vital not only to the design and development of computer programs but also to the strategic use of computational power to solve problems across disciplines. The process of creating meaningful and efficient solutions, often done in collaboration with others, typically involves these steps: defining the problem, breaking apart large problems into smaller ones, recombining existing solutions, analyzing different solutions, using data to inform new potential solutions, and looking at information in new ways to develop innovative solutions.

Computational thinking plays an important role in supporting the creation of solutions to problems, both large and small. Algorithms, programs, simulations, and data are essential to all computing systems, empowering people to communicate and collaborate with others around the world. The standards promote development of foundational skills, knowledge, and experience to solve problems by creating solutions that utilize computational thinking concepts and practices.

Computational Thinking: Modeling and Simulation

<table>
<tr><td>Standard</td><td colspan="3">4-6.CT.1 Develop a computational model of a system that shows changes in output when there are changes in inputs.</td></tr>
<tr><td></td><td>Nouns</td><td colspan="2">Verbs</td></tr>
<tr><td></td><td>model
system
changes
output
input</td><td colspan="2">develop</td></tr>
<tr><td>Clarifying Statement</td><td colspan="3">The emphasis is on understanding, at a conceptual level, that models or simulations can be created to respond to deliberate changes in inputs.</td></tr>
<tr><td>Focus Questions</td><td colspan="3">What are deliberate changes?
How do we monitor these changes?
How can we develop a model or simulation to show a change from input to output?
What is an example of something that changes in output when we change the input?
What simulations and models will you use to show this?</td></tr>
<tr><td>Academic Language</td><td>Computational model
System
Inputs
Outputs
Variables</td><td>Parameters
Simulation
Modeling
Function
Algorithm</td><td>Data representation
Prediction
Analysis
Iteration
Visualization</td></tr>
<tr><td>NYSED Examples</td><td colspan="3">Example 1: Students could use the movement of a rope to simulate a sound wave and then explain what happens (in terms of pitch) if they slow down (lower pitch) or speed up (higher pitch) the oscillations modeled by the simulation of sound waves using the rope. (SCIENCE)
Example 2: Students could connect input/output to science with plants and the impact when the inputs change (e.g., light, watering). (SCIENCE)
Example 3: Students can connect it to changing ingredients or amounts of ingredients in a recipe changes the outcome. They can compare this to a computer system.
Example 4: Students could connect it to exercise and how the heart rate changes based on different inputs. (PHYSICAL EDUCATION)</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="3">Mathematics:
• Graphing and Functions: Creating graphs or charts to visually represent the relationship between inputs and outputs in computational models, discussing how changes in inputs affect outputs.</td></tr>
</table>

Impacts of Computing | Computational Thinking | Networks and Systems Design | Cybersecurity | Digital Literacy

- ***Patterns and Relationships***: *Exploring patterns and relationships in numerical data generated by computational models, identifying mathematical functions that describe the behavior of the system.*
- ***Problem-Solving***: *Using mathematical reasoning to predict outcomes and analyze data from computational models, discussing strategies for adjusting inputs to achieve desired outputs.*

Science:

- ***Scientific Method***: *Applying the scientific method to design and test computational models that simulate natural phenomena or scientific processes, discussing hypotheses, observations, and conclusions.*
- ***Experimental Design***: *Designing experiments to collect data for computational models, discussing variables, controls, and the reliability of model predictions.*
- ***Systems Thinking***: *Exploring how systems interact with their environment through computational models, discussing feedback loops, cause-and-effect relationships, and system dynamics.*

Technology Education/ Digital Literacy:

- ***Coding and Programming***: *Learning basic coding concepts to implement computational models, discussing how programming languages translate inputs into outputs through algorithms.*
- ***Digital Tools***: *Using simulation software or online platforms to create and visualize computational models, discussing the advantages of digital tools in exploring complex systems.*
- ***Debugging and Iteration***: *Iteratively refining computational models based on feedback and testing, discussing strategies for troubleshooting errors and improving model accuracy.*

Social Studies/ Civics:

- ***Economic Systems***: *Developing computational models to simulate economic principles such as supply and demand, discussing how changes in market inputs affect economic outcomes.*
- ***Political Systems***: *Exploring how computational models can simulate voting behavior or political decision-making processes, discussing the impact of policy changes on societal outputs.*
- ***Environmental Systems***: *Studying environmental issues through computational models that simulate ecosystems or climate change scenarios, discussing the implications of human actions on natural outputs.*

Language Arts:

- ***Writing and Communication****: Writing reports or explanations of computational models, discussing how clear communication of inputs, processes, and outputs enhances understanding.*
- ***Reading Comprehension****: Reading articles or stories about real-world applications of computational modeling in various fields (e.g., weather forecasting, engineering), discussing the benefits and limitations.*
- ***Critical Thinking****: Analyzing the reliability and validity of computational models, discussing biases, assumptions, and the role of evidence in model predictions.*

Art*:*

- ***Visual Representation****: Creating visual representations of computational models through drawings, diagrams, or digital art, illustrating how inputs and outputs interact within the system.*
- ***Digital Media****: Using digital media tools to animate or simulate computational models, demonstrating dynamic changes in outputs based on varying inputs.*
- ***Creative Expression****: Exploring creative interpretations of computational models in art projects, discussing how artistic techniques can convey complex concepts and relationships.*

Health Education*:*

- ***Biological Systems****: Developing computational models to simulate biological processes such as metabolism or disease transmission, discussing the factors influencing health outcomes.*
- ***Health Technology****: Exploring how computational models support medical research and healthcare decision-making, discussing ethical considerations in using technology to predict health outcomes.*
- ***Health Literacy****: Analyzing health data generated by computational models, discussing how understanding inputs and outputs improves health literacy and informed decision-making.*

Physical Education*:*

- ***Fitness and Performance****: Using computational models to analyze factors affecting athletic performance, discussing how adjustments in training inputs influence physical outputs.*
- ***Sports Technology****: Exploring sports analytics through computational models that simulate game strategies or player statistics, discussing innovations in sports technology and data-driven coaching.*
- ***Nutrition and Wellness****: Developing computational models to simulate dietary inputs and health outcomes, discussing the impact of nutrition on*

	physical well-being and performance.
Additional Examples and Resources	*Input/output charts for math (input a number then ex. Times 7 is the rule, output is answer)* *Recipe above, doubling or tripling the recipe to serve more people, or halving to serve fewer people.* *Water temperature changes to room temperature water when it is heated or ice is added.* *Talking about earthquakes and tornados* *Tsunami* *Exercising- measuring your heart rate, after certain exercising.*

Computational Thinking: Data Analysis and Visualization

<table>
<tr><td rowspan="3">Standard</td><td colspan="2">4-6.CT.2 Collect digital data related to a real life question or need.</td></tr>
<tr><td>Nouns</td><td>Verbs</td></tr>
<tr><td>data
question
need</td><td>collect</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">The emphasis is on using digital tools to collect and organize multiple data points.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">How can we organize data to make sense?
What are the best practices for collecting data?
How can we use digital tools to collect data related to a question?
What is a question we can ask our student body to analyze their answers?
What will their answers tell us?
How can we display their answers?
How is collecting data digitally more efficient and accurate?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Digital data
Data collection
Data gathering
Data acquisition
Real-life question
Real-life need
Data sources
Data sets
Data sampling
Data analysis
Data interpretation
Data visualization
Data representation
Data processing
Data management</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students could create a classroom poll or survey using digital tools and report the results to the class.
Example 2: Put out a survey to the school community to gather feedback on lunch choices, new recess equipment, etc. and see how the survey populates a spreadsheet to show the data.
Example 3: Students could use digital balances to collect the masses of different objects to identify the heaviest object. (SCIENCE)
Example 4: Students can enrich their scientific inquiry by using a digital platform to collect data from an experiment. (SCIENCE)</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Mathematics:
• Data Collection: Learning to collect and organize data using digital tools (e.g., spreadsheets, online surveys), discussing the importance of accurate data collection methods.
• Graphing and Analysis: Creating graphs and charts to visualize collected data, discussing trends, patterns, and outliers to draw conclusions.</td></tr>
</table>

- ***Statistics***: *Introducing basic statistical concepts such as mean, median, mode, and range to analyze data collected for a real-life question or need.*

Science:

- ***Scientific Inquiry***: *Applying scientific methods to formulate hypotheses and design experiments to collect digital data, discussing variables, controls, and data integrity.*
- ***Data Interpretation***: *Analyzing digital data to draw conclusions about natural phenomena or scientific questions, discussing reliability, validity, and potential sources of error.*
- ***Environmental Awareness***: *Using digital data to study environmental changes or ecological impacts, discussing conservation efforts and sustainability practices.*

Social Studies/ Civics:

- ***Cultural Studies***: *Collecting digital data related to cultural practices, traditions, or historical events, discussing how digital data can preserve and share cultural heritage.*
- ***Community Studies***: *Conducting surveys or interviews using digital tools to collect data about community needs or opinions, discussing civic engagement and social responsibility.*
- ***Geography***: *Using digital mapping tools to collect and analyze geographic data (e.g., population density, land use), discussing how data informs urban planning and policy decisions.*

Language Arts:

- ***Research Skills***: *Learning to conduct online research to collect digital data for a specific topic or question, discussing credible sources and evaluating information.*
- ***Writing and Communication***: *Writing reports or presentations based on collected digital data, practicing clear communication and argumentation skills.*
- ***Digital Literacy***: *Discussing ethical considerations in collecting and using digital data, including privacy, consent, and responsible digital citizenship.*

Technology Education/ Digital Literacy:

- ***Data Literacy***: *Learning basic data literacy skills to interpret and analyze digital data, discussing how data-driven insights can inform decision-making.*

	• ***Digital Tools**: Using digital tools and software to collect, analyze, and visualize data, discussing the advantages and limitations of different technologies.* • ***Coding and Automation**: Exploring how coding and automation can streamline data collection processes, discussing applications in robotics, sensors, and IoT devices.* ***Art**:* • ***Visual Representation**: Creating visual artworks or digital projects that represent data collected for a real-life question or need, discussing creative ways to visualize information.* • ***Interactive Media**: Designing interactive media projects that engage audiences with collected digital data, fostering empathy and understanding of complex issues.* • ***Digital Storytelling**: Using digital storytelling tools to present narratives or documentaries based on collected data, exploring storytelling as a medium for social awareness and advocacy.* ***Health Education**:* • ***Health Data**: Collecting digital data related to health behaviors, nutrition, or physical activity, discussing how data influences personal wellness decisions.* • ***Epidemiology**: Studying patterns of disease transmission or public health issues using digital data, discussing preventive measures and healthcare interventions.* • ***Health Technology**: Exploring the use of digital health technologies to monitor and collect data on medical conditions, discussing ethical implications and patient privacy.* ***Physical Education**:* • ***Fitness Data**: Using digital fitness trackers or apps to collect data on physical activity and performance, discussing the role of technology in promoting active lifestyles.* • ***Sports Analytics**: Collecting digital data on sports performance (e.g., statistics, biomechanics), discussing how data-driven insights inform coaching and training strategies.* • ***Nutrition and Wellness**: Using digital tools to collect data on dietary habits and wellness behaviors, discussing the impact of nutrition on overall health and fitness.*
Additional Examples and	*-poll students in school and put results/model into school newspaper* *-create a poll and practice bar graphs from the data*

Resources	*Opinion polls (ex. Did the British actually win the Battle of Bunker Hill?) Students could put data from a survey into different formats and compare those formats.* *students could collect data on a relevant question and present in the school's newspaper*

Computational Thinking: Data Analysis and Visualization

Standard	**4-6.CT.3** Visualize a simple data set in order to highlight relationships and persuade an audience.	
	Nouns	**Verbs**
	data set *relationships* *audience*	*visualize* *highlight* *persuade*
Clarifying Statement	The emphasis is on identifying and organizing relevant data to emphasize particular parts of the data in support of a claim.	
Focus Questions	*How do we recognize relationships between data?* *How do we find relevant data?* *How could data be organized to show data that supports a claim?* *What is the best way to represent our data?* *What is the problem that we are trying to persuade someone about?* *What potential relationships can we discover?*	
Academic Language	*Data visualization* *Graph* *Chart* *Plot* *Diagram*	*Relationship* *Correlation* *Trend* *Pattern* *Visualization tools*	*Bar graph* *Line graph* *Pie chart* *Scatter plot* *Infographic*
NYSED Examples	Example 1: Students could use a spreadsheet program to create a data table and graph of student interests and hobbies in their class and sort them by category. (MATH) Example 2: Students could sort a data set of sports teams by wins, points scored, or points allowed. (MATH) Example 3: Students could collect a variety of data to highlight relationships and persuade an audience in multiple subject areas.	
Interdisciplinary Connections	***Mathematics***: • ***Graphing Skills***: *Learning to create simple graphs and charts (e.g., bar graphs, line graphs) to visualize data sets, discussing how visual representations help identify patterns and relationships.* • ***Numerical Analysis***: *Analyzing numerical data to interpret trends and correlations, discussing how data visualization supports mathematical reasoning and problem-solving.*	

- ***Probability and Statistics***: *Using data visualization to represent probabilities and statistical distributions, discussing the likelihood and impact of different outcomes.*

Language Arts:

- ***Writing and Communication***: *Writing persuasive essays or presentations based on visualized data, discussing how visual representations enhance understanding and influence audience perceptions.*
- ***Visual Literacy***: *Analyzing visual data representations (e.g., infographics, charts) in texts and media, discussing techniques for effectively communicating information visually.*
- ***Public Speaking***: *Practicing presentation skills to effectively convey data insights to an audience, discussing strategies for engaging and persuading listeners.*

Science:

- ***Experimental Design***: *Designing experiments to collect data for visualization, discussing variables, controls, and methods for ensuring data accuracy and reliability.*
- ***Data Interpretation***: *Using data visualization to analyze scientific observations and draw conclusions, discussing the importance of evidence-based reasoning in scientific inquiry.*
- ***Environmental Studies***: *Visualizing environmental data (e.g., weather patterns, habitat changes) to study ecosystems and natural phenomena, discussing implications for conservation and sustainability.*

Social Studies/ Civics:

- ***Historical Data***: *Visualizing historical data sets (e.g., population changes, economic trends) to analyze historical events and social movements, discussing how data shapes historical interpretations.*
- ***Geographic Information Systems (GIS)***: *Using GIS tools to map and visualize geographic data (e.g., demographics, land use), discussing spatial relationships and their impact on community planning.*
- ***Civic Engagement***: *Visualizing data on civic issues (e.g., voting trends, community services) to advocate for social change and civic participation, discussing strategies for informed decision-making.*

Technology Education/ Digital Literacy:

- ***Data Visualization Tools***: *Using digital tools (e.g., spreadsheets, online visualization software) to create interactive data visualizations, discussing the advantages of digital tools in representing complex data.*

	• ***Coding and Programming**: Writing simple scripts or algorithms to generate visualizations from data sets, discussing how programming skills enhance data analysis and presentation.* • ***Ethical Considerations**: Discussing ethical considerations in data visualization, including accuracy, bias, and privacy concerns, to promote responsible digital citizenship.* ***Art**:* • ***Visual Arts**: Creating artworks or digital illustrations that interpret visualized data sets creatively, discussing how art can convey emotions and narratives through data.* • ***Digital Media**: Using digital media tools to produce animations or interactive presentations of data visualizations, discussing multimedia techniques to engage and inform audiences.* • ***Critical Analysis**: Critiquing visual representations in art and media for accuracy and effectiveness in communicating data-driven messages, discussing the intersection of art and information.* ***Health Education**:* • ***Health Data**: Visualizing health-related data (e.g., nutrition, exercise habits) to promote wellness and healthy behaviors, discussing the role of data in making informed health decisions.* • ***Epidemiology**: Using data visualization to analyze patterns of disease spread and prevention strategies, discussing the impact of public health initiatives on community well-being.* • ***Health Literacy**: Interpreting visualized health information to understand healthcare outcomes and disparities, discussing strategies for promoting health equity and access to care.* ***Physical Education**:* • ***Fitness Data**: Visualizing fitness data (e.g., heart rate, physical activity levels) to track personal fitness goals and progress, discussing strategies for improving physical well-being through data-driven insights.* • ***Sports Analytics**: Analyzing sports performance data through visualizations (e.g., player statistics, game strategies), discussing how data informs coaching and enhances athletic performance.* • ***Nutrition and Wellness**: Visualizing dietary habits and nutritional data to support healthy lifestyle choices, discussing the role of nutrition in physical fitness and overall well-being.*
Additional Examples and	*Students could research data to write a persuasive essay about a topic. (ELA)*

Computational Thinking: Data Analysis and Visualization

Resources	*Students could create line plots based on a collection of data (measuring the growth of a plant)* *Use Google tools to create various types of data tables, graphs, etc.. based on a set of information (experiment data, polls, etc..) and have students analyze that to support their claim* *Students could survey students about their favorite foods offered in cafeteria and go to the school's administration or board about food choices offered based on student data*

Computational Thinking: Abstraction and Decomposition

<table>
<tr><td>Standard</td><td colspan="2">4-6.CT.4 Decompose a problem into smaller named tasks, some of which can themselves be decomposed into smaller steps.</td></tr>
<tr><td></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td></td><td>problem
tasks
steps</td><td>decompose</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">The focus is on identifying smaller steps that solve a larger problem, recognizing that some of those steps must be broken down further until each step is manageable.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">What is decomposition?
How many steps is too many?
How do I know when I have broken the steps down enough?
How can a problem be broken down into smaller steps?
What are the different steps to a problem?
What would the steps be to even that broken down part?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Decomposition
Problem-solving
Algorithm design
Task
Subtask

Step
Modularization
Abstraction
Top-down design
Hierarchical structure

Function
Procedure
Method
Recursion
Divide and conquer</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students could plan a classroom party by separating the task (party) into subtasks such as food, activities, and prizes. The subtasks could then be broken down further into steps like determining which activities could be present and planning what order to do each activity.
Example 2: Science experiments where something is built (like a circuit) and what parts are repeated vs changed. (SCIENCE)
Example 3: Students can determine how to write their name with the least amount of pen strokes, or on a computer program, the least number of steps.</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Mathematics:

• Problem-Solving: Decomposing mathematical problems into smaller steps (e.g., addition, subtraction, multiplication, division), discussing strategies for breaking down complex problems.
• Numerical Operations: Practicing computational skills through step-by-step decomposition of arithmetic problems, discussing the order of operations and problem-solving techniques.</td></tr>
</table>

- ***Geometry and Measurement****: Breaking down geometric problems (e.g., calculating area, perimeter) into smaller tasks, discussing formulas and methods for accurate measurement.*

Language Arts*:*

- ***Writing Process****: Decomposing the writing process into smaller tasks (e.g., brainstorming, drafting, revising), discussing strategies for organizing ideas and improving clarity.*
- ***Reading Comprehension****: Breaking down reading tasks (e.g., identifying main ideas, making inferences) into smaller steps, discussing comprehension strategies and textual analysis.*
- ***Grammar and Language Skills****: Decomposing grammar and language tasks (e.g., sentence structure, punctuation) into manageable steps, discussing rules and conventions of language.*

Science*:*

- ***Scientific Method****: Decomposing scientific investigations into smaller tasks (e.g., hypothesis formulation, data collection, conclusion drawing), discussing experimental design and variables.*
- ***Experimental Procedures****: Breaking down laboratory procedures into sequential steps, discussing safety protocols and scientific accuracy in data collection.*
- ***Research Skills****: Decomposing research projects into smaller tasks (e.g., topic selection, information gathering, citation), discussing reliable sources and ethical research practices.*

Social Studies/ Civics*:*

- ***Historical Inquiry****: Decomposing historical inquiries into smaller tasks (e.g., primary source analysis, timeline creation, cause-and-effect analysis), discussing historical perspectives and interpretations.*
- ***Geographic Investigations****: Breaking down geographic inquiries (e.g., map analysis, region comparison) into manageable steps, discussing spatial relationships and cultural influences.*
- ***Civic Engagement****: Decomposing civic projects (e.g., community service initiatives, voter education campaigns) into actionable tasks, discussing roles and responsibilities in civic participation.*

Technology Education/ Digital Literacy*:*

- ***Computer Programming****: Decomposing programming tasks (e.g., algorithm design, debugging, testing) into smaller steps, discussing logic and sequencing in coding.*

	• ***Digital Projects**: Breaking down digital projects (e.g., multimedia presentations, interactive websites) into component tasks, discussing design principles and user engagement.* • ***Cybersecurity**: Decomposing cybersecurity protocols (e.g., password protection, data encryption, threat detection) into actionable steps, discussing online safety and privacy concerns.* ***Art**:* • ***Artistic Creation**: Decomposing art projects (e.g., sketching, shading, coloring) into sequential tasks, discussing techniques and artistic expression.* • ***Visual Design**: Breaking down design tasks (e.g., layout composition, color theory, typography) into smaller steps, discussing visual communication and aesthetics.* • ***Creative Process**: Decomposing creative processes (e.g., brainstorming, concept development, critique) into structured tasks, discussing collaboration and artistic growth.* ***Health Education**:* • ***Personal Wellness**: Decomposing health goals (e.g., nutrition planning, exercise routines, stress management) into achievable steps, discussing lifestyle choices and well-being.* • ***Healthcare Decisions**: Breaking down healthcare decisions (e.g., preventive care, treatment options, medical consultations) into informed steps, discussing health literacy and advocacy.* • ***Safety and First Aid**: Decomposing safety procedures (e.g., emergency response, first aid techniques) into sequential actions, discussing preparedness and risk management.* ***Physical Education**:* • ***Fitness Plans**: Decomposing fitness plans (e.g., warm-up exercises, strength training, cool-down routines) into structured activities, discussing physical goals and progress tracking.* • ***Sports Skills**: Breaking down sports skills (e.g., dribbling in basketball, kicking in soccer, serving in volleyball) into fundamental steps, discussing technique and athletic development.* • ***Teamwork and Strategy**: Decomposing team sports strategies (e.g., offensive plays, defensive formations) into coordinated tasks, discussing collaboration and sportsmanship.*
Additional Examples and	*Solving a math problem or a word problem step by step.* *Using the writing process for a written piece of writing. (ELA)*

Computational Thinking: Abstraction and Decomposition

Resources	*Give directions on how to do something or how to get somewhere* *Setting a goal and breaking it into steps*

Computational Thinking: Abstraction and Decomposition

<table>
<tr><td>Standard</td><td colspan="3">4-6.CT.5 Identify and name a task within a problem that gets performed multiple times while solving that problem, but with slightly different concrete details each time.</td></tr>
<tr><td rowspan="2"></td><td colspan="2">Nouns</td><td>Verbs</td></tr>
<tr><td colspan="2">task
problem
concrete details</td><td>identify
solving
name
performed</td></tr>
<tr><td>Clarifying Statement</td><td colspan="3">The focus is on recognizing that the same general steps are often repeated while solving a problem, even though some of the details may differ.</td></tr>
<tr><td>Focus Questions</td><td colspan="3">What are the parts/steps that are similar in each problem?
What steps are repeated when solving a problem?</td></tr>
<tr><td>Academic Language</td><td colspan="3">Task
Subtask
Procedure
Function
Iteration

Loop
Repetition
Conditional statement
Parameter
Argument

Variable
Input
Output
Algorithm
Modularization</td></tr>
<tr><td>NYSED Examples</td><td colspan="3">Example 1: Students could tabulate the results of a survey noting that they are asked to compute the sum or average of multiple different columns within a dataset. (MATH)</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="3">Mathematics:

• Math Problem-Solving: Identifying repetitive tasks in solving math problems (e.g., addition with different numbers, multiplication with varying factors), discussing strategies for applying operations and recognizing patterns.
• Word Problems: Analyzing word problems that require repeated application of mathematical operations with different contexts (e.g., solving different types of measurement conversions), discussing real-world applications of math skills.
• Patterns and Sequences: Exploring numerical patterns and sequences (e.g., Fibonacci sequence, geometric progressions) that involve repeated calculations with changing parameters, discussing mathematical reasoning and prediction.

Language Arts:</td></tr>
</table>

- ***Writing Process***: *Recognizing recurring tasks in the writing process (e.g., brainstorming topics, drafting paragraphs with different details), discussing organization and coherence in writing.*
- ***Grammar and Editing***: *Identifying grammatical tasks that vary with different writing contexts (e.g., using different verb tenses, applying punctuation rules), discussing language conventions and clarity.*
- ***Literary Analysis***: *Analyzing texts for recurring themes or motifs that require interpretation with varying details, discussing critical thinking and textual evidence.*

Science:

- ***Experimental Procedures***: *Identifying repeated steps in scientific experiments (e.g., measuring variables, conducting trials with different conditions), discussing accuracy and reliability in data collection.*
- ***Observational Studies***: *Noticing recurring tasks in observing natural phenomena (e.g., recording data on weather patterns, monitoring plant growth under different conditions), discussing scientific inquiry and hypothesis testing.*
- ***Data Analysis***: *Analyzing scientific data sets with recurring calculations or comparisons (e.g., averaging measurements, comparing trends over time), discussing data interpretation and conclusions.*

Social Studies/ Civics:

- ***Historical Inquiry***: *Investigating historical events with recurring actions or decisions (e.g., analyzing multiple battles in a war, examining political decisions with varying outcomes), discussing historical perspectives and consequences.*
- ***Geographic Analysis***: *Identifying recurring tasks in geographical studies (e.g., mapping changes in population density, comparing economic indicators across regions), discussing spatial analysis and global interconnectedness.*
- ***Civic Engagement***: *Recognizing repetitive tasks in civic participation (e.g., voting in elections with different candidates, advocating for community issues with varying strategies), discussing democratic principles and active citizenship.*

Technology Education/ Digital Literacy:

- ***Coding and Programming***: *Naming repetitive tasks in coding (e.g., iterating through a loop with different conditions, processing data arrays with varying elements), discussing algorithmic thinking and problem-solving.*

- ***Digital Design***: *Identifying recurring design elements in digital projects (e.g., creating user interfaces with different layouts, coding interactive features with varying functionalities), discussing user experience and interface design principles.*
- ***Cybersecurity***: *Recognizing repeated security protocols in digital safety practices (e.g., encrypting data with different algorithms, updating software with varying security patches), discussing online safety and risk management.*

Art:

- ***Artistic Techniques***: *Naming recurring tasks in artistic techniques (e.g., blending colors with different intensities, sketching shapes with varying proportions), discussing creativity and expression in visual arts.*
- ***Art History***: *Analyzing artworks with recurring themes or styles across different periods (e.g., exploring portraits with varying artistic interpretations, studying landscapes with changing artistic movements), discussing cultural contexts and artistic influences.*
- ***Digital Art***: *Identifying repetitive tasks in digital art creation (e.g., manipulating layers with different effects, designing digital compositions with varied elements), discussing digital tools and artistic innovation.*

Health Education:

- ***Health Practices***: *Recognizing repeated tasks in promoting health habits (e.g., practicing hygiene with different methods, exercising with varying routines), discussing personal wellness and disease prevention.*
- ***Nutritional Planning***: *Identifying recurring tasks in meal planning (e.g., balancing nutrients with different dietary needs, preparing recipes with varying ingredients), discussing nutrition education and healthy eating habits.*
- ***Mental Health Strategies***: *Naming repetitive tasks in managing emotional well-being (e.g., practicing mindfulness with different techniques, seeking support with varying strategies), discussing mental health awareness and coping skills.*

Physical Education:

- ***Fitness Training***: *Identifying repeated exercises in fitness routines (e.g., performing repetitions with varying intensities, practicing drills with different skills), discussing physical conditioning and athletic performance.*
- ***Sports Skills***: *Recognizing recurring tasks in sports training (e.g., refining techniques with different drills, strategizing plays with varying opponents), discussing teamwork and sportsmanship.*

	• ***Health Monitoring**: Naming repetitive tasks in monitoring personal fitness goals (e.g., tracking progress with different metrics, setting benchmarks with varying criteria), discussing goal-setting and fitness assessment.*
Additional Examples and Resources	*-students can learn and practice the steps to find the mean of a data set* *Steps in long division and multiplication of multi-digit numbers.* *Going through steps in the writing process* *Listing steps in completing a science experiment (i.e. 6 steps of scientific method* *-steps to finding the mean (average) in a data step* *-steps to finding the range of a data set*

Computational Thinking: Algorithms and Programming

<table>
<tr><td>Standard</td><td colspan="2">4-6.CT.6 Compare two or more algorithms and discuss the advantages and disadvantages of each for a specific task.</td></tr>
<tr><td rowspan="2"></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td>algorithms
advantages
disadvantages
task</td><td>compare
discuss</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">Tasks can be unplugged or related to a computer program and reflect a task with a specific result that can be checked.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">What are the similarities and differences between two different algorithms?
Which algorithm do you prefer and why?
What are the advantages and disadvantages of a specific algorithm?
Why do we learn both/all algorithms?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Algorithms
Comparison
Efficiency
Complexity
Advantages
Disadvantages
Time complexity
Space complexity
Performance
Accuracy
Precision
Scalability
Trade-offs
Implementation
Evaluation</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students could compare algorithms for making a culturally relevant food item (i.e. pb&j, doner, bahn mi, etc.). Students could then choose an algorithm and explain the reason for their choice. Possible reasons for their choices might include the detail, the fewest steps, or it describes the process most similar to how they make the item at home.
Example 2: Compare math approaches for a designated problem and see which is more efficient and why. (MATH)
Example 3: Students could plan two routes to a certain location and compare the routes to see which is faster, less mileage or fewest stop lights. Then discuss which is the best route and why. (SOCIAL STUDIES)</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Mathematics:
• Problem-Solving: Comparing algorithms for solving math problems (e.g., addition, multiplication) with different strategies (e.g., standard algorithm vs. mental math), discussing efficiency and accuracy.
• Patterns and Sequences: Analyzing algorithms for identifying and extending number patterns (e.g., Fibonacci sequence), discussing computational methods and pattern recognition skills.</td></tr>
</table>

- ***Logical Reasoning***: *Exploring algorithms for solving logic puzzles (e.g., Sudoku), discussing systematic approaches and problem-solving strategies.*

Language Arts:

- ***Grammar and Language Processing***: *Comparing algorithms for spell-checking or grammar correction in word processing software, discussing language accuracy and editing tools.*
- ***Reading Comprehension***: *Analyzing algorithms for text summarization or comprehension assessment, discussing automated reading aids and critical analysis skills.*
- ***Writing Process***: *Comparing algorithms for generating writing prompts or brainstorming ideas, discussing creativity and writing fluency.*

Science:

- ***Data Analysis***: *Comparing algorithms for analyzing scientific data sets (e.g., sorting data by size or value), discussing efficiency in data management and interpretation.*
- ***Experimental Design***: *Analyzing algorithms for controlling variables in experiments (e.g., randomization methods), discussing reliability and reproducibility in scientific investigations.*
- ***Simulation Models***: *Comparing algorithms for simulating natural phenomena (e.g., weather patterns), discussing predictive modeling and scientific simulations.*

Social Studies/ Civics:

- ***Historical Analysis***: *Comparing algorithms for timeline construction or historical event sequencing, discussing chronological reasoning and historical interpretation.*
- ***Geographic Mapping***: *Analyzing algorithms for geographic data visualization (e.g., mapping population density), discussing spatial analysis and geographic information systems (GIS).*
- ***Political Simulations***: *Comparing algorithms for simulating voting processes or policy simulations, discussing civic engagement and decision-making algorithms.*

Technology Education/ Digital Literacy:

- ***Computer Programming***: *Comparing algorithms for sorting data (e.g., bubble sort vs. quicksort), discussing efficiency in computational tasks and algorithmic complexity.*

	• ***Cybersecurity**: Analyzing algorithms for encryption or decryption methods (e.g., symmetric vs. asymmetric encryption), discussing data security and cryptography principles.* • ***Artificial Intelligence**: Comparing algorithms for machine learning tasks (e.g., classification algorithms), discussing applications in automated decision-making and AI ethics.* ***Art**:* • ***Digital Art**: Comparing algorithms for generating visual effects or artistic filters (e.g., image manipulation algorithms), discussing creativity in digital media and algorithmic art.* • ***Art History**: Analyzing algorithms for digital art restoration or preservation (e.g., image enhancement algorithms), discussing cultural heritage and digital preservation techniques.* • ***Interactive Media**: Comparing algorithms for user interaction in digital installations or interactive artworks, discussing user experience and design innovation.* ***Health Education**:* • ***Medical Diagnostics**: Comparing algorithms for medical diagnosis (e.g., symptom analysis algorithms), discussing accuracy and reliability in healthcare decision support systems.* • ***Health Monitoring**: Analyzing algorithms for analyzing health metrics (e.g., fitness tracking algorithms), discussing personal wellness and data-driven health management.* • ***Public Health**: Comparing algorithms for analyzing epidemiological data (e.g., disease outbreak algorithms), discussing disease prevention and public health strategies.* ***Physical Education**:* • ***Fitness Tracking**: Comparing algorithms for tracking physical activity (e.g., step counting algorithms), discussing accuracy and motivation in fitness apps and wearable devices.* • ***Sports Analytics**: Analyzing algorithms for analyzing sports performance metrics (e.g., player performance algorithms), discussing coaching strategies and athlete development.* • ***Athletic Training**: Comparing algorithms for designing personalized workout routines (e.g., exercise recommendation algorithms), discussing fitness goals and training efficiency.*
Additional Examples and	*-students could present ways to come up with a solution to a relevant community/world problem (litter, electricity, etc) (Science)*

Resources	*-write directions on different ways to get to different places in the classroom* *-Writing step by step details to something.* *-Making directions to a certain location in the school/classroom - see who has the quickest and easiest.* *-Students can use code.org to work with coding and algorithms.*

Computational Thinking: Algorithms and Programming

<table>
<tr><td>Standard</td><td colspan="2">4-6.CT.7 Identify pieces of information that might change as a program or process runs.</td></tr>
<tr><td></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td></td><td>information
program
process</td><td>identify</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">The focus is on identifying information that needs to be updated as a computation progresses.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">How may a process change as a program is being run?
How can a human versus a computer take data that is constantly changing?
What in the data is changing?
How does the computer program note this?
How does the changing data impact the visual graph?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Variables
Data
Input
Output
State

Parameters
Arguments
User input
Environmental variables
Configuration settings

Control flags
Loop counters
Conditional statements
Function return values
Error messages</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students can explore how their history of recent documents change over the course of time, depending on what files they are opening. Another example can be music applications that track the number of times a song is played.</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Mathematics:

• Patterns and Sequences: Recognizing patterns in mathematical operations and identifying how variables change in equations over time.
• Graphing Data: Creating simple graphs to visualize changes in variables over different periods, such as temperature over the course of a day.
• Mathematical Modeling: Using basic algebraic expressions to predict changes in quantities based on given conditions.

Language Arts:

• Storytelling: Writing short stories where characters make decisions affecting outcomes, reflecting on how choices lead to different narratives.</td></tr>
</table>

- ***Reading Comprehension****: Reading age-appropriate books or stories with branching narratives, discussing how different choices by characters lead to varied outcomes.*
- ***Creative Writing****: Writing imaginative narratives where characters face changing circumstances and adapt their actions accordingly.*

Science*:*

- ***Natural Processes****: Investigating changes in natural phenomena such as the water cycle or plant growth, discussing how variables like temperature or sunlight affect outcomes.*
- ***Scientific Experiments****: Conducting simple experiments to observe changes in physical properties (e.g., melting ice cubes, growing plants) under different conditions.*
- ***Animal Behavior****: Studying how animals adapt their behavior to changing environmental conditions, linking observations to concepts of variables and outcomes.*

Social Studies/ Civics*:*

- ***Historical Events****: Studying historical events and discussing how different decisions by leaders or groups could have led to alternative outcomes.*
- ***Cultural Practices****: Exploring cultural practices and traditions that adapt to changing circumstances or environments over time.*
- ***Community Decision-Making****: Discussing local community issues and proposing different solutions based on changing conditions or needs.*

Digital Literacy/ Technology Education*:*

- ***Software Simulations****: Using age-appropriate programming tools or simulations to demonstrate how variables change based on input data or user interactions.*
- ***Digital Storytelling****: Creating interactive stories or animations where characters respond differently to changing scenarios, illustrating cause-and-effect relationships.*
- ***Basic Coding Concepts****: Introducing concepts of variables and loops in programming through games or activities that require adjusting parameters to achieve desired outcomes.*

Art*:*

- ***Visual Arts****: Creating artwork that depicts changing seasons, weather patterns, or day-to-night transitions, emphasizing the use of color and light to show variations.*

	• ***Creative Expression**: Using art techniques to illustrate changing emotions or moods, exploring how visual elements convey different states or conditions.* • ***Collaborative Projects**: Collaborating on group art projects that evolve over time, incorporating individual contributions that adapt to changing themes or artistic styles.* ***Health Education**:* • ***Personal Wellness**: Discussing personal health habits and behaviors that change based on daily routines, weather conditions, or seasonal influences.* • ***Nutritional Choices**: Exploring how dietary choices affect energy levels and mood throughout the day, discussing adaptations for different activities or situations.* • ***Physical Activity**: Participating in activities that vary in intensity and duration, reflecting on how exercise routines can be adjusted to achieve specific health goals.* ***Ethics and Philosophy**:* • ***Decision-Making**: Discussing ethical considerations in decision-making processes, exploring how values and principles guide choices that impact outcomes.* • ***Personal Values**: Reflecting on personal values and beliefs that influence responses to changing circumstances or challenges in daily life.* • ***Digital Citizenship**: Learning about ethical behaviors online, such as respecting others' privacy and contributing positively to digital communities.*
Additional Examples and Resources	*Discussing how devices update even after they come out (desktops, laptops, cell phones, smart watches, etc..)* *In science, as we are completing the process or steps in an experiment, there might be times where we need to make changes to what we are doing when we realize something isn't working or going right.* *-explore the count of students going through cafeteria line* *During an election students can watch the map change colors as the votes come in.* *Students can create a poll and analyze how the results are changing over time.* *Watch plants grow and determine how the data is changing over time.*

	How history has changed over time, how you used to have to hand write documents and now you can type it.

Computational Thinking: Algorithms and Programming

<table>
<tr><td>Standard</td><td colspan="3">4-6.CT.8 Develop algorithms or programs that use repetition and conditionals for creative expression or to solve a problem.</td></tr>
<tr><td rowspan="2"></td><td>Nouns</td><td colspan="2">Verbs</td></tr>
<tr><td>algorithm
program
problem
repetition
conditional</td><td colspan="2">develop
use
solve</td></tr>
<tr><td>Clarifying Statement</td><td colspan="3">The focus is on having students work with each of the conditionals and repetition (loops or iteration), but without having to use them in conjunction with one another.</td></tr>
<tr><td>Focus Questions</td><td colspan="3">How can we use algorithms and programs to create patterns to solve problems?
Which part do you see/hear/notice is being repeated?
What is the pattern?
What are the advantages of repetitions?
What are the disadvantages of repetitions?</td></tr>
<tr><td>Academic Language</td><td colspan="3">Algorithm
Program
Repetition
Loop
Conditional
If statement
While loop
For loop
Control structure
Iteration
Flow control
Creative expression
Problem-solving
Logic
Sequence</td></tr>
<tr><td>NYSED Examples</td><td colspan="3">Example 1: Students could guide a paper mouse through a maze to find cheese by developing a set of rules for the “mouse” to follow. Rules could include the following: move forward one space and repeat until the mouse hits a wall, and if there is a wall, turn left then move forward.
Example 2: Students could program a math quiz that uses conditionals to check the user’s answers and display a response. The students could use a loop to make a sprite dance when the user completes the quiz. (MATH)
Example 3: Students could use Boolean expressions and conditionals to analyze a group of numbers.</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="3">Mathematics:
• Patterns and Sequences: Recognizing patterns in mathematical operations and identifying how variables change in equations over time.
• Graphing Data: Creating simple graphs to visualize changes in variables over different periods, such as temperature over the course of a day.</td></tr>
</table>

- ***Mathematical Modeling****: Using basic algebraic expressions to predict changes in quantities based on given conditions.*

Language Arts*:*

- ***Storytelling****: Writing short stories where characters make decisions affecting outcomes, reflecting on how choices lead to different narratives.*
- ***Reading Comprehension****: Reading age-appropriate books or stories with branching narratives, discussing how different choices by characters lead to varied outcomes.*
- ***Creative Writing****: Writing imaginative narratives where characters face changing circumstances and adapt their actions accordingly.*

Science*:*

- ***Natural Processes****: Investigating changes in natural phenomena such as the water cycle or plant growth, discussing how variables like temperature or sunlight affect outcomes.*
- ***Scientific Experiments****: Conducting simple experiments to observe changes in physical properties (e.g., melting ice cubes, growing plants) under different conditions.*
- ***Animal Behavior****: Studying how animals adapt their behavior to changing environmental conditions, linking observations to concepts of variables and outcomes.*

Social Studies/ Civics*:*

- ***Historical Events****: Studying historical events and discussing how different decisions by leaders or groups could have led to alternative outcomes.*
- ***Cultural Practices****: Exploring cultural practices and traditions that adapt to changing circumstances or environments over time.*
- ***Community Decision-Making****: Discussing local community issues and proposing different solutions based on changing conditions or needs.*

Digital Literacy/ Technology Education*:*

- ***Software Simulations****: Using age-appropriate programming tools or simulations to demonstrate how variables change based on input data or user interactions.*
- ***Digital Storytelling****: Creating interactive stories or animations where characters respond differently to changing scenarios, illustrating cause-and-effect relationships.*

	• ***Basic Coding Concepts***: *Introducing concepts of variables and loops in programming through games or activities that require adjusting parameters to achieve desired outcomes.* ***Art***: • ***Visual Arts***: *Creating artwork that depicts changing seasons, weather patterns, or day-to-night transitions, emphasizing the use of color and light to show variations.* • ***Creative Expression***: *Using art techniques to illustrate changing emotions or moods, exploring how visual elements convey different states or conditions.* • ***Collaborative Projects***: *Collaborating on group art projects that evolve over time, incorporating individual contributions that adapt to changing themes or artistic styles.* ***Health Education***: • ***Personal Wellness***: *Discussing personal health habits and behaviors that change based on daily routines, weather conditions, or seasonal influences.* • ***Nutritional Choices***: *Exploring how dietary choices affect energy levels and mood throughout the day, discussing adaptations for different activities or situations.* • ***Physical Activity***: *Participating in activities that vary in intensity and duration, reflecting on how exercise routines can be adjusted to achieve specific health goals.* ***Ethics and Philosophy***: • ***Decision-Making***: *Discussing ethical considerations in decision-making processes, exploring how values and principles guide choices that impact outcomes.* • ***Personal Values***: *Reflecting on personal values and beliefs that influence responses to changing circumstances or challenges in daily life.* • ***Digital Citizenship***: *Learning about ethical behaviors online, such as respecting others' privacy and contributing positively to digital communities.*
Additional Examples and Resources	*Coding activities* *The coding robots where the lines tell it the different path, direction, speed, etc. of where to go and how.*

	-Finding repetition or patterns within music or art *-creating loops of music using looping machine* *-Students can analyze a computer algorithm and create a t-chart that lists the advantages and disadvantages they noticed of the repetitions in the algorithm.*

Computational Thinking: Algorithms and Programming

Standard	**4-6.CT.9** Explain each step of an algorithm or program that includes repetition and conditionals for the purposes of debugging.	
	Nouns	**Verbs**
	step *algorithm* *program* *repetition* *conditional* *debugging*	*explain*
Clarifying Statement	Debugging frequently involves stepping or tracing through a program as if you were the computer to reveal errors.	
Focus Questions	*How can we retrace the steps to find errors?* *How can this program be broken down into steps so we can check for errors?* *Why is it important to "debug"?* *Why does repetition help reveal errors?* *What do you notice about the process of debugging?*	
Academic Language	*Algorithm* *Program* *Debugging* *Step-by-step* *Repetition*	*Loop* *Conditional* *If statement* *While loop* *For loop*	*Control structure* *Iteration* *Flow control* *Logic* *Breakpoint*
NYSED Examples	Example 1: Students could describe how a sprite will behave when different values are passed into a conditional statement. Example 2: Students could consider code snippets with bugs and collaborate with peers to find the errors by reading and discussing the code. Example 3: Students can create steps for a problem in multiple subject areas, then have another student follow the steps exactly. Describe and debug any issues.	
Interdisciplinary Connections	***Mathematics***: • ***Numerical Patterns***: *Explaining steps in mathematical sequences (e.g., counting by twos, Fibonacci sequence) that involve repetition and conditionals, discussing pattern recognition and sequence generation.* • ***Problem-Solving Strategies***: *Describing steps in solving math problems with iterative approaches (e.g., long division, multi-digit addition), discussing accuracy and problem-solving techniques.*	

- ***Logical Reasoning***: *Explaining steps in logical puzzles (e.g., Sudoku, logic grid puzzles) that use iterative methods and conditional reasoning, discussing deduction and logical thinking skills.*

Language Arts:

- ***Grammar and Writing***: *Describing steps in grammar exercises (e.g., identifying parts of speech, correcting sentences) that involve repetitive practice and conditional rules, discussing language conventions and editing skills.*
- ***Reading Comprehension***: *Explaining steps in reading strategies (e.g., summarizing texts, making predictions) that use iterative processes and conditional understanding, discussing comprehension skills and textual analysis.*
- ***Creative Writing***: *Describing steps in the writing process (e.g., drafting narratives, revising poems) that include iterative revisions and conditional adjustments, discussing storytelling and creative expression.*

Science:

- ***Experimental Procedures***: *Explaining steps in scientific experiments (e.g., measuring variables, recording observations) that involve iterative data collection and conditional analysis, discussing experimental design and accuracy.*
- ***Data Analysis***: *Describing steps in analyzing scientific data (e.g., graphing results, drawing conclusions) that use iterative calculations and conditional interpretations, discussing data interpretation and scientific inquiry.*
- ***Simulation Models***: *Explaining steps in computer simulations (e.g., modeling climate patterns, simulating chemical reactions) that involve iterative simulations and conditional outcomes, discussing predictive modeling and simulation accuracy.*

Social Studies/ Civics:

- ***Historical Investigations***: *Describing steps in historical inquiries (e.g., researching events, analyzing primary sources) that involve iterative research and conditional interpretations, discussing historical perspectives and causation.*
- ***Geographic Analysis***: *Explaining steps in geographic studies (e.g., mapping data, comparing regions) that use iterative mapping techniques and conditional spatial analysis, discussing geographic information systems (GIS) and spatial reasoning.*
- ***Civic Engagement***: *Describing steps in civic projects (e.g., community surveys, advocating for policies) that involve iterative community*

engagement and conditional decision-making, discussing civic responsibility and participatory democracy.

***Technology Education/ Digital Literacy**:*

- ***Computer Programming**: Explaining steps in coding tasks (e.g., writing loops, implementing if-else statements) that involve iterative programming and conditional logic, discussing algorithmic thinking and debugging strategies.*
- ***Digital Tools**: Describing steps in using digital applications (e.g., multimedia editing, data analysis tools) that involve iterative processes and conditional formatting, discussing digital literacy and technological proficiency.*
- ***Cybersecurity**: Explaining steps in securing digital information (e.g., setting up firewalls, implementing encryption algorithms) that involve iterative security measures and conditional access controls, discussing online safety and cybersecurity practices.*

***Art**:*

- ***Artistic Techniques**: Describing steps in artistic processes (e.g., sketching portraits, painting landscapes) that involve iterative artistic techniques and conditional artistic choices, discussing creativity and visual expression.*
- ***Art History**: Explaining steps in art historical analysis (e.g., comparing artistic movements, interpreting artworks) that involve iterative art criticism and conditional interpretations, discussing cultural context and art appreciation.*
- ***Digital Art**: Describing steps in creating digital artworks (e.g., digital painting, graphic design) that involve iterative digital techniques and conditional design decisions, discussing digital tools and artistic innovation.*

***Health Education**:*

- ***Health Practices**: Explaining steps in health routines (e.g., fitness workouts, meal planning) that involve iterative health practices and conditional dietary choices, discussing personal wellness and health management.*
- ***Nutritional Planning**: Describing steps in meal preparation (e.g., balancing nutrients, cooking methods) that involve iterative cooking techniques and conditional nutritional adjustments, discussing healthy eating habits and dietary guidelines.*
- ***Mental Health Strategies**: Explaining steps in managing emotional well-being (e.g., stress reduction techniques, mindfulness exercises) that*

	involve iterative coping strategies and conditional stress management, discussing mental health awareness and self-care practices. ***Physical Education**:* ● ***Fitness Training**: Describing steps in fitness programs (e.g., strength training, cardiovascular exercises) that involve iterative fitness routines and conditional workout adjustments, discussing physical fitness and exercise principles.* ● ***Sports Skills**: Explaining steps in practicing sports techniques (e.g., dribbling drills, shooting exercises) that involve iterative skill development and conditional gameplay strategies, discussing athletic training and sportsmanship.* ● ***Health Monitoring**: Describing steps in monitoring personal health metrics (e.g., tracking heart rate, recording exercise progress) that involve iterative health assessments and conditional fitness goals, discussing health assessment and wellness tracking.*
Additional Examples and Resources	*-students can "find the mistake" in examples provided by teacher (ELA, math) Students can look at one another's work and follow a repetitive procedure for each one to determine the mistake made in the problem.*

Computational Thinking: Algorithms and Programming

<table>
<tr><td>Standard</td><td colspan="2">4-6.CT.10 Describe the steps taken and choices made to design and develop a solution using an iterative design process.</td></tr>
<tr><td rowspan="2"></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td>step
choices
solution
process</td><td>describe
design
develop</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">An iterative design process involves defining the problem or goal, developing a solution or prototype, testing the solution or prototype, and repeating the process until the problem is solved or desired result is achieved. Describing can include speaking or writing.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">How can we design and develop a solution using an iterative design process?
How is the “iterative design process” like the “scientific method”?
Why is it important to continue to test our prototype and repeat the process instead of just trying it once or twice?
How does testing your prototype help you improve it?
How does repetition help you solve the problem?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Iterative design process
Solution development
Problem-solving
Design choices
Prototyping
Testing
Feedback
Revision
Refinement
Evaluation
User-centered design
Agile methodology
Sprint
User feedback
Usability testing</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Starting with a specific issue or topic (e.g., recycling) students explore the issue or topic and then use the iterative design process to create and deliver a presentation to the class describing the different steps that were taken to revise the presentation. (SCIENCE)
Example 2: Students could play a game where they try to solve problems faster than a computer. They can then describe the solutions they tried and how the revised their approach.
Example 3: Students should keep a reflective journal for each of their coding projects. They could explain the problem their program is solving, how they decided how to do it including revisions they made along the way, debugging they did, and how the program worked. (ELA)
Example 4: Students could write a persuasive essay on a topic of their choosing, get feedback from a classmate on what was or was not convincing, and then revise the essay. They can also describe how they revised their essay based on the classmate’s feedback. (ELA)</td></tr>
</table>

Computational Thinking: Algorithms and Programming

Interdisciplinary Connections	

Mathematics:

- ***Problem Solving***: *Describing steps in solving math problems through trial and error, revising strategies based on outcomes, discussing problem-solving skills and mathematical reasoning.*
- ***Patterns and Sequences***: *Exploring iterative processes in mathematical patterns (e.g., number sequences, geometric shapes), discussing pattern recognition and iterative reasoning.*
- ***Data Analysis***: *Analyzing iterative approaches to data collection and analysis (e.g., conducting surveys, organizing data), discussing data interpretation and statistical reasoning.*

Language Arts:

- ***Writing Process***: *Describing steps in writing compositions (e.g., brainstorming, drafting, revising), revisiting ideas based on feedback, discussing writing fluency and editing skills.*
- ***Reading Comprehension***: *Exploring iterative reading strategies (e.g., previewing, questioning, summarizing), revising understanding based on new insights, discussing critical reading and comprehension strategies.*
- ***Creative Expression***: *Developing iterative approaches to creative writing (e.g., storytelling, poetry), refining narratives through multiple drafts, discussing creativity and self-expression.*

Science:

- ***Experimental Design***: *Describing steps in conducting scientific experiments (e.g., hypothesis formulation, testing variables, analyzing results), refining methods based on observations, discussing scientific inquiry and experimentation.*
- ***Engineering Design***: *Exploring iterative processes in designing and testing solutions (e.g., building models, evaluating prototypes), revising designs based on performance, discussing engineering principles and innovation.*
- ***Environmental Studies***: *Analyzing iterative approaches to environmental investigations (e.g., studying ecosystems, monitoring changes), adapting methods based on new data, discussing environmental stewardship and sustainability.*

Social Studies/ Civics:

- ***Historical Inquiry***: *Describing steps in researching historical events (e.g., gathering primary sources, analyzing perspectives), revising interpretations based on new evidence, discussing historical analysis and interpretation.*

- ***Geographic Exploration****: Exploring iterative approaches to geographic inquiries (e.g., mapping, analyzing geographic data), refining understandings through spatial analysis, discussing geographical thinking and global awareness.*
- ***Civic Engagement****: Analyzing iterative processes in civic projects (e.g., community initiatives, advocacy campaigns), adjusting strategies based on community feedback, discussing civic responsibility and active citizenship.*

Technology Education/ Digital Literacy*:*

- ***Design Thinking****: Describing steps in the design thinking process (e.g., empathizing, defining, ideating, prototyping, testing), iterating solutions based on user feedback, discussing innovation and problem-solving skills.*
- ***Digital Tools****: Exploring iterative approaches to using digital tools (e.g., multimedia creation, coding projects), refining projects through iterative improvements, discussing digital literacy and technological proficiency.*
- ***Cybersecurity****: Analyzing iterative approaches to cybersecurity measures (e.g., implementing security protocols, testing vulnerabilities), revising strategies based on threat assessments, discussing online safety and cybersecurity practices.*

Art*:*

- ***Artistic Processes****: Describing steps in artistic creation (e.g., sketching, painting, sculpting), revising artworks through iterative refinements, discussing creativity and aesthetic expression.*
- ***Art History****: Exploring iterative interpretations of art history (e.g., analyzing art movements, critiquing artworks), revising understandings based on art analysis, discussing cultural contexts and artistic evolution.*
- ***Digital Art****: Analyzing iterative approaches to digital art projects (e.g., graphic design, digital animation), refining digital artworks through iterative editing, discussing digital tools and artistic innovation.*

Health Education*:*

- ***Health Planning****: Describing steps in health planning (e.g., setting fitness goals, creating meal plans), adjusting plans through iterative health assessments, discussing wellness and healthy lifestyle choices.*
- ***Nutritional Education****: Exploring iterative approaches to nutrition education (e.g., learning food groups, meal planning), adapting diets based on nutritional needs, discussing dietary habits and health outcomes.*

	• ***Mental Health Strategies****: Analyzing iterative approaches to mental health strategies (e.g., stress management techniques, mindfulness practices), refining coping strategies through iterative practice, discussing mental well-being and self-care.* ***Physical Education****:* • ***Fitness Training****: Describing steps in fitness training programs (e.g., strength training, cardiovascular exercises), adjusting workouts through iterative fitness assessments, discussing physical fitness and exercise routines.* • ***Sports Skills****: Exploring iterative approaches to sports skills development (e.g., practicing drills, refining techniques), improving performance through iterative training, discussing athletic training and sportsmanship.* • ***Health Monitoring****: Analyzing iterative approaches to health monitoring (e.g., tracking physical activity, monitoring vital signs), adjusting health goals through iterative assessments, discussing health promotion and well-being.*
Additional Examples and Resources	*-given real-world word problems in math class, students can use the iterative design process to find the best solutions* *Students could create a scavenger hunt where they have to revise the clues they give in order to make it the most efficient discovery possible.*

Networks and Systems Design

Computing devices typically do not operate in isolation. Networks connect computing devices to share data and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world by providing fast, secure communication, and facilitating innovation. Individuals interact with data using a variety of input and output devices that are part of a more complex computing system. The hardware and software that make up a computing system process data in digital form. A basic understanding of hardware and software is useful when troubleshooting a computing system that does not work as intended.

The Networks and Systems Design standards aim to prepare students to understand the basic functioning of the computing systems and networks that are used as fundamental tools in our personal and professional lives.

Networks and Systems Design: Hardware & Software

<table>
<tr><td>Standard</td><td colspan="2">4-6.NSD.1 Propose improvements to the design of a computing technology based on an analysis of user interactions with that technology.</td></tr>
<tr><td rowspan="2"></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td>improvements
design
computing technology
analysis</td><td>propose</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">The emphasis is on thinking about how the user interface could be optimized for the purpose of the computing technology and user interactions.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">How can we improve the computers of today?
What aspects would we want to improve?
How could I improve _____?
What could I do to make this better and more user friendly?
How do you make commuting technology easier for people to use?
How can you improve technology so that it is easier to navigate?</td></tr>
<tr><td>Academic Language</td><td colspan="2">User interactions
User experience (UX)
Human-computer interaction (HCI)
Usability
User interface (UI)
Feedback analysis
Observation
Surveys
Interviews
Usability testing
Design improvement
Iterative design
Prototyping
User-centered design
Design thinking</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students could make recommendations on how to improve a tool, device, or app based on their experiences or those of their classmates. Example 2: Students studying the Industrial Revolution can propose improvements to inventions during that time. (SOCIAL STUDIES)
Example 3: Discuss sensors and different outputs beyond typical, i.e., if temperature rises then ac is turned on.</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Mathematics:
• Data Analysis: Analyzing user feedback data (e.g., surveys, ratings) to identify common issues or preferences, proposing improvements to user interface (UI) based on statistical analysis of data trends.
• Measurement and Geometry: Measuring ergonomic factors (e.g., screen size, keyboard placement) to optimize usability, proposing geometric adjustments to device design for better user interaction.</td></tr>
</table>

Language Arts:

- ***Writing and Communication***: *Drafting persuasive proposals for technology improvements, using descriptive language to articulate user experience issues and proposed design changes.*
- ***Reading Comprehension***: *Analyzing user manuals or tech reviews to understand common usability challenges, proposing clearer instructional texts or tooltips for better user guidance.*

Science:

- ***Engineering Design Process***: *Applying iterative design principles to create prototypes based on user feedback, proposing engineering adjustments (e.g., hardware upgrades, software updates) for enhanced usability.*
- ***Human Anatomy and Physiology***: *Studying ergonomic principles to propose physical adjustments (e.g., device weight distribution, button size) that align with human comfort and usability.*

Social Studies/ Civics:

- ***Cultural and Social Analysis***: *Investigating cultural differences in technology usage, proposing culturally responsive design features that accommodate diverse user needs and preferences.*
- ***Ethical Considerations***: *Discussing ethical implications of data privacy and security in technology design, proposing improvements that prioritize user data protection and digital rights.*

Technology Education/ Digital Literacy:

- ***Digital Tools***: *Using digital tools (e.g., graphic design software, prototyping apps) to visualize proposed design improvements, creating digital mock-ups or interactive prototypes.*
- ***Information Literacy***: *Researching case studies of successful technology redesigns, proposing evidence-based improvements informed by best practices in human-computer interaction (HCI).*

Art:

- ***Visual Arts***: *Applying principles of design (e.g., balance, contrast, usability) to propose visual improvements in UI/UX design, creating sketches or digital artwork to illustrate proposed changes.*
- ***Digital Art***: *Using digital art techniques to create user interface mock-ups, proposing aesthetic enhancements that enhance user engagement and visual appeal.*

	***Health Education**:* • ***Ergonomics and Wellness**: Studying ergonomic guidelines for technology use, proposing adjustments that promote physical health and comfort during device interaction.* • ***Mental Health**: Considering user stress levels and mental well-being during technology use, proposing design changes that reduce cognitive load and improve user experience.* ***Physical Education**:* • ***Movement and Physical Interaction**: Analyzing how physical movement affects device usability (e.g., touchscreen gestures), proposing interface adjustments that optimize interaction and responsiveness.* • ***Sports and Recreation**: Drawing parallels between user experience in sports and technology, proposing intuitive design improvements that mimic natural movements and gestures.*
Additional Examples and Resources	*Talk about how tools changed over time, pulley, incline plane, ex. (Do this in 4th ELA).*

Networks and Systems Design: Hardware & Software

Standard	**4-6.NSD.2** Model how computer hardware and software work together as a system to accomplish tasks.	
	Nouns	**Verbs**
	hardware *software*	*model*
Clarifying Statement	A model should only include the basic elements of a computer system, including input, output, processor, and storage.	
Focus Questions	*What is the difference between hardware and software?* *What is included in a model?* *What are the basic parts of a computer system?* *How could I create a model to illustrate how the hardware and software of a computer work together?* *What problem would occur if the hardware and software didn't work together?* *Why is it important to work together to accomplish tasks?*	
Academic Language	*Computer hardware* *Computer software* *System* *CPU (Central Processing Unit)* *RAM (Random Access Memory)*	*Hard drive* *Motherboard* *Input devices* *Output devices* *Operating system* *Application software* *User interface*	*Device drivers* *Peripheral devices* *System architecture*
NYSED Examples	Example 1: Students can draw the computing system, program an animation of how the computer system works, or act it out in some way. Example 2: Students can sketch or diagram their computer and explain what each part does and how it is part of the overall computer.	
Interdisciplinary Connections	***Mathematics:*** • ***Systems and Relationships:*** *Analyzing how different components of computer hardware (e.g., CPU, RAM) interact with software (e.g., operating system, applications) to perform calculations and execute commands.* • ***Measurement and Data:*** *Measuring and comparing processing speeds and storage capacities of different hardware components, correlating with software performance benchmarks.* ***Language Arts:***	

- ***Technical Writing:*** *Describing in writing how hardware components (e.g., keyboard, mouse) and software (e.g., word processing program) collaborate to create and edit documents.*
- ***Reading Comprehension:*** *Reading technical manuals or guides to understand how hardware and software interact, summarizing key points to explain their functionality.*

Science:

- ***Systems Thinking:*** *Investigating the function of computer hardware and software as interconnected systems, identifying inputs (commands, data) and outputs (results, actions) of computational processes.*
- ***Technology and Society:*** *Discussing how advances in computer hardware and software have impacted daily life, analyzing examples such as smartphones or gaming consoles.*

Social Studies/ Civics:

- ***Digital Citizenship:*** *Exploring ethical considerations related to computer hardware and software use, discussing issues like digital rights, privacy, and responsible use of technology.*
- ***History of Technology:*** *Researching historical developments in computer hardware and software, tracing advancements from early computers to modern devices and applications.*

Technology Education/ Digital Literacy:

- ***Digital Tools:*** *Using simulation software or virtual labs to explore how computer hardware and software interact, conducting experiments to observe system behaviors.*
- ***Coding and Programming:*** *Learning basic programming concepts to create simple scripts that demonstrate interactions between hardware (e.g., sensors) and software (e.g., control programs).*

Art:

- ***Visual Representation:*** *Creating diagrams or infographics to illustrate the relationship between computer hardware and software, visually representing how data flows through a system.*
- ***Design Thinking:*** *Applying principles of design to propose ergonomic enhancements or interface improvements that optimize user interaction with computer systems.*

Physical Education:

	• ***Movement and Interaction:*** *Relating physical actions (e.g., keyboard typing, mouse clicking) to their corresponding digital responses, understanding how hardware translates physical input into software commands.* • ***Health and Wellness:*** *Discussing ergonomic considerations in computer use, promoting proper posture and breaks to prevent physical strain associated with prolonged technology use.*
Additional Examples and Resources	*Students could create a 3D model showing the different parts and how they work together.* *4th grade Smithsonian kits students create "energy models" showing the systems working together, how they change, etc.. Can use this to compete with computers, software, etc..* *Learning about the computer system, what each part does, how it works.*

Networks and Systems Design: Hardware & Software

<table>
<tr><td>Standard</td><td colspan="2">4-6.NSD.3 Determine potential solutions to solve hardware and software problems using common troubleshooting strategies.</td></tr>
<tr><td rowspan="2"></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td>solutions
hardware
software
troubleshooting strategy</td><td>determine</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">The focus is on trying multiple strategies to troubleshoot problems, including rebooting the device, checking for power, checking network availability, closing and reopening an application, try using a different browser, and checking settings within an application.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">Why is the device not working?
What does troubleshooting mean?
What can you try first?
Is there another time you've had a similar problem?
Is this a hardware issue or software issue?
What are the basic problems that happen with computers?
What strategies can we use to troubleshoot?
How can I find the best solution to the problem?
What strategies could we use if there is a problem with our computer?
How could I help a friend who is having a computer problem?
What should I try first if my computer is not working correctly?
What is a list of possible strategies I could use if my computer is not working?
How can we determine where the problem is coming from?
What are some possible solutions to solve the problem?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Troubleshooting
Hardware problems
Software problems
Diagnosis
Problem-solving
Solution identification
Debugging
Error messages
System logs
Device drivers
Compatibility issues
Firmware updates
System restore
Rebooting
Technical support</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: A teacher might lead students in creating a classroom checklist for basic problems, such as the device not responding, no power, no network connection, application crashing, no sound, or password entry not working. Example 2: Students can create their own basic troubleshooting guide for simple computer issues to publish to students in lower grades. (ELA)</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Mathematics:</td></tr>
</table>

- ***Logical Reasoning****: Applying logical thinking to identify patterns in hardware or software malfunctions, proposing step-by-step troubleshooting sequences akin to solving math problems.*
- ***Problem-Solving Strategies****: Using problem-solving techniques (e.g., trial and error, breaking down complex issues) similar to solving math equations to troubleshoot hardware and software issues.*

Language Arts*:*

- ***Writing Process****: Documenting troubleshooting steps in a clear and sequential manner, akin to writing a procedural text or manual, to guide others in resolving similar technology issues.*
- ***Reading Comprehension****: Analyzing technical manuals or guides to understand troubleshooting procedures, summarizing and applying learned strategies to resolve technology problems.*

Science*:*

- ***Experimental Design****: Applying systematic approaches to diagnose and resolve hardware or software problems, akin to conducting experiments to test hypotheses and variables.*
- ***Critical Thinking****: Evaluating cause-and-effect relationships in technology malfunctions, proposing hypotheses and testing solutions based on scientific inquiry principles.*

Social Studies/ Civics*:*

- ***Problem Analysis****: Investigating historical case studies of technological advancements and failures, applying lessons learned to propose effective troubleshooting strategies for current issues.*
- ***Civic Engagement****: Discussing the role of technology in civic life, proposing strategies to address digital divide issues and improve access to troubleshooting resources.*

Technology Education/ Digital Literacy*:*

- ***Digital Tools****: Using diagnostic tools and software utilities to identify hardware and software problems, applying digital literacy skills to interpret diagnostic results and propose solutions.*
- ***Ethical Considerations****: Discussing ethical implications of technology use and troubleshooting, proposing solutions that prioritize data privacy and user security.*

Art*:*

	• ***Design Thinking***: *Applying principles of design thinking to analyze user experiences with technology malfunctions, brainstorming creative solutions to enhance usability and functionality.* • ***Visual Arts***: *Using visual representation (e.g., diagrams, flowcharts) to illustrate troubleshooting steps and proposed solutions, enhancing understanding through visual aids.* ***Health Education***: • ***Ergonomics***: *Applying ergonomic principles to address physical discomfort caused by technology use, proposing hardware adjustments to promote user health and well-being.* • ***Mental Health***: *Considering the impact of technology malfunctions on stress levels and mental well-being, proposing troubleshooting strategies that minimize user frustration and anxiety.* ***Physical Education***: • ***Movement and Interaction***: *Applying principles of physical movement and interaction to troubleshoot touchscreen or motion-sensitive technologies, proposing adjustments to improve responsiveness and usability.* • ***Sportsmanship and Teamwork***: *Collaborating with peers to brainstorm and implement troubleshooting strategies, fostering teamwork and peer support in resolving technology issues.*
Additional Examples and Resources	• *Students create a troubleshooting guide to post in the classroom.* • *Students create a t-chart or flow chat of common everyday issues that you have to troubleshoot (not necessarily computer related) (make it visual)* • *Provide students with various scenarios of handling solutions to different problems, the best way to get started* • *Students identify an "IT support student" in the classroom* • *Students interview the IT expert to find out common problems or solutions* • *Start a class log of tech issues that arise, then identify the level of support needed* • *Learning about the computer system, what each part does, how it works.*

Networks and Systems Design: Networks and the Internet

<table>
<tr><td rowspan="3">Standard</td><td colspan="2">4-6.NSD.4 Model how data is structured to transmit through a network.</td></tr>
<tr><td>Nouns</td><td>Verbs</td></tr>
<tr><td>data
network</td><td>model</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">The focus is on understanding that data is broken down into smaller pieces and labeled to travel through a network and reassembled.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">How is data transmitted?
How is data structured?
What is coding? How do you do it?
How does data get from one place to another?
How is data broken down into smaller pieces?
Where do you think data is stored?
Are there different locations where you can store data?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Data
Network
Transmission
Structure
Packet
Protocol
TCP/IP
Ethernet
Wi-Fi
Router
Switch
Internet Protocol (IP)
Network interface card (NIC)
Transmission Control Protocol (TCP)
Data encapsulation</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: The teacher could run a series of live simulations in which students act out the flow of information through servers, routers, and other devices to transmit a message.
Example 2: A teacher might have students cut up a map of the United States, then place the states in envelopes and transmit the "packets" through a physical network of students. At the destination, the packets could then be reassembled back into a map of the United States. (SOCIAL STUDIES)</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Mathematics:
• Number Systems: Exploring how data is represented in binary (base-2) form and how computers use this system to store and transmit information.
• Patterns and Sequences: Identifying the sequence of steps data takes when it travels through a network, similar to understanding a pattern or sequence in math problems.</td></tr>
</table>

- ***Graphs and Charts***: *Creating simple graphs or charts to visually represent data transmission speeds and capacities in different types of networks.*

Language Arts:

- ***Technical Writing***: *Writing step-by-step instructions (like a recipe) to explain how data moves through a network, using vocabulary appropriate for their age level.*
- ***Reading Comprehension***: *Reading simplified explanations or stories about how information travels online or through devices, to enhance comprehension of digital concepts.*
- ***Storytelling***: *Using storytelling to explain how data packets find their way through a network, akin to characters navigating through a maze or adventure.*

Science:

- ***Physics of Signals***: *Exploring basic concepts of how signals travel through wires or air, drawing parallels to how messages are sent through a network.*
- ***Simple Experiments***: *Conducting hands-on experiments with string and cups to simulate how information (like sound) can be transmitted over distances, similar to data traveling in a network.*
- ***Nature of Waves***: *Learning about sound waves or light waves to understand the basic principles behind data transmission methods used in networks.*

Social Studies/ Civics:

- ***Community Connections***: *Exploring how communities are connected through digital networks, such as learning about how people communicate across distances using the internet.*
- ***Digital Citizenship***: *Discussing the importance of using technology responsibly and safely, including topics like privacy and being kind online.*
- ***Technology in History***: *Learning about historical communication methods and comparing them to modern digital networks, such as how letters were sent versus sending emails.*

Digital Literacy/ Technology Education:

- ***Basic Network Understanding***: *Introducing the concept of how devices connect to the internet and share information, using simple diagrams and real-world examples.*

	• ***Computer Basics**: Learning about basic computer components (like CPUs and modems) and how they work together to send and receive data.* • ***Online Safety**: Discussing how to stay safe online, including concepts like not sharing personal information and recognizing safe websites.* ***Art**:* • ***Visual Representation**: Creating simple drawings or diagrams to illustrate how data travels through a network, using symbols or icons to represent devices and connections.* • ***Story Illustration**: Drawing scenes or images that show how information moves from one place to another, using creative storytelling techniques to explain digital concepts.* • ***Interactive Media**: Using basic digital tools to create simple animations or interactive stories that demonstrate how data flows through different types of networks.* ***Health Education**:* • ***Personal Data Awareness**: Discussing how personal health information is transmitted securely through medical systems, emphasizing the importance of privacy and trust.* • ***Healthy Online Habits**: Exploring ways to maintain physical and mental health while using technology, including strategies for balancing screen time and physical activity.* • ***Digital Safety**: Learning about protecting personal information online, including concepts like strong passwords and recognizing phishing attempts.* ***Ethics and Philosophy**:* • ***Digital Ethics**: Discussing the ethical considerations of using technology, such as respecting others' privacy and being responsible digital citizens.* • ***Thinking Critically**: Reflecting on the impact of digital choices and actions, considering how decisions made online can affect others and oneself.* • ***Values and Decisions**: Exploring personal values related to technology use, discussing topics like fairness, honesty, and respecting others' rights in digital spaces.*
Additional Examples and Resources	*Coding-showing how information can be broken down into small pieces (1's and 0's) and that then can be sent through networks, computers, etc.. to convey a message or command.*

	Pixels: Pictures are made up on many broken down pixels that together when transmitted make an image up. Using this as an example to show things breaking down and making up something different. Pictures/pixels can also be sent from one device to another. *Show how a circuit works and electricity traveling*

Networks and Systems Design: Networks and the Internet

<table>
<tr><td>Standard</td><td colspan="2">4-6.NSD.5 Describe that data can be stored locally or remotely in a network.</td></tr>
<tr><td></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td></td><td>data
network
stored
locally
remotely</td><td>describe</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">The focus is on describing that data must be stored on a physical device. Access to remotely stored data is restricted by the networks, and to access non-local data a connection to the network is required.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">What’s the difference between local and remote storage?
What are the benefits of saving locally vs. remotely (cloud storage).
How do I get to the data that I saved?
How do I save what I’ve done (created/completed)?
How can I access my content in Google when I’m not connected to the internet?
How does it get stored, flashdrives or on the computer?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Data
Local storage
Remote storage
Network
Server
Client
Cloud storage
Database
File system
Backup
Synchronization
Offline storage
Online storage
Access control
Data security</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students could explain the difference between video games that are stored locally, that you can play without internet, and other games are stored on a server and cannot be played without internet.
Example 2: Students can compare different TV/Movie offerings based on how the media is stored and accessed (DVR, cloud, download, etc.).
Example 3: Students could explain the difference between saving a file to their device (local copy) and saving it to the network or cloud (remote copy). Then figuring out which one they would no longer be able to access if the internet went down.</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Mathematics:
• Data Representation: Introducing the concept of data storage capacity using simple mathematical units (e.g., bytes, kilobytes) to understand how much information can be stored locally versus remotely.
• Graphing Data: Creating bar graphs or charts to compare local storage capacities (e.g., on a computer or flash drive) versus remote storage</td></tr>
</table>

options (e.g., cloud services), emphasizing quantitative analysis and data visualization skills.

***Language Arts**:*

- ***Technical Writing**: Writing explanations or reports that describe the differences between local and remote data storage, using vocabulary appropriate for their grade level.*
- ***Reading Comprehension**: Reading age-appropriate articles or stories that discuss how data is stored and accessed both locally and remotely, focusing on comprehension and critical thinking about digital concepts.*
- ***Creative Writing**: Writing stories or scenarios that involve characters using local or remote storage solutions to solve problems or share information, encouraging imaginative thinking and storytelling.*

***Science**:*

- ***Technology in Everyday Life**: Investigating examples of how local and remote data storage technologies impact daily activities and scientific research, exploring real-world applications in fields like meteorology, astronomy, or biology.*
- ***Data Handling**: Conducting simple experiments or simulations to illustrate the differences in access speed and reliability between local storage devices (e.g., USB drives) and remote storage solutions (e.g., cloud servers).*
- ***Environmental Science**: Discussing the environmental impacts of data storage technologies, comparing energy consumption and sustainability factors between local devices and remote data centers.*

***Social Studies/ Civics**:*

- ***Global Connections**: Exploring how remote data storage (e.g., cloud computing) facilitates global communication and collaboration, discussing its role in connecting people and communities worldwide.*
- ***Digital Citizenship**: Learning about responsible data management practices, including privacy considerations and data security measures when using local and remote storage options.*
- ***History of Communication**: Studying historical developments in data storage technologies, comparing traditional methods (e.g., paper records) with modern digital storage solutions and their societal impacts.*

***Digital Literacy/ Technology Education**:*

- ***Computer Basics**: Learning about different types of storage devices (e.g., hard drives, SSDs) and their capacities, exploring how data is organized and accessed locally on personal computers.*

- ***Cloud Computing****: Introducing cloud storage concepts and services (e.g., Google Drive, Dropbox) through interactive demonstrations or simulations, emphasizing the benefits and challenges of remote data storage.*
- ***Coding and Algorithms****: Exploring how programming languages and algorithms manage data storage and retrieval processes, highlighting the role of both local and remote storage solutions in software development.*

Art*:*

- ***Visual Representation****: Creating diagrams, infographics, or posters that visually explain the differences between local and remote data storage, using symbols and illustrations to enhance understanding.*
- ***Digital Art****: Using digital tools to create artwork or animations that depict data being stored and accessed locally versus remotely, encouraging creativity in visual storytelling and digital media production.*
- ***Collaborative Projects****: Collaborating on multimedia presentations or exhibitions that showcase the evolution of data storage technologies, integrating artistic elements with technical explanations for diverse audiences.*

Health Education*:*

- ***Personal Data Management****: Discussing strategies for managing personal data on local devices versus using remote storage options, including considerations for privacy, security, and accessibility.*
- ***Telemedicine and Healthcare****: Exploring how remote data storage supports telemedicine and electronic health records (EHR), discussing benefits and challenges in healthcare delivery and patient information management.*
- ***Ethical Considerations****: Reflecting on ethical dilemmas related to data storage and privacy rights, discussing responsible decision-making and digital citizenship principles in health-related contexts.*

Ethics and Philosophy*:*

- ***Ethical Debates****: Engaging in discussions about ethical issues surrounding data storage practices, including topics such as data ownership, privacy rights, and digital footprint awareness.*
- ***Philosophical Inquiry****: Reflecting on philosophical questions about the nature of data and information, considering perspectives on information access, control, and responsibility in a digital society.*

	• ***Values Exploration***: *Exploring personal values related to data privacy and security, discussing how ethical considerations influence choices about using local and remote data storage solutions.*
Additional Examples and Resources	*Students using Google tools to store their information* *Students compare/contrast creating a document in Microsoft word vs. Google Docs* *Compare/contrast laptop vs. Chromebook* *Similar to example one: The cloud and devices like Google Drive that students interact with on an almost daily basis are examples of data being stored on a server. When we lose the internet, we can't necessarily access these files unless we are in an offline mode. However, if we download the file to our desktops, that can be accessed/stored locally and we can access it at all times. The video game connection would click/connect with many students.*

Cybersecurity

In a digital world, all individuals have a responsibility to protect data and the computing resources they access. Cybersecurity encompasses the physical, digital, and behavioral actions that can be taken to increase this security. These measures are meant to ensure the confidentiality and integrity of data and computing resources, as well as ensure that they are accessible to the users who are supposed to have access to them. Digital security includes understanding and identifying risks, implementing appropriate safeguards, and being prepared to respond to potential attacks.

The Cybersecurity standards prepare students to understand why data and computing resources need to be protected, who might access them, and why they might do so whether intentionally malicious or not. It is important that students know how to employ basic safeguards to protect data and computing resources and how to appropriately respond if a breach occurs.

Cybersecurity: Risks

Standard	**4-6.CY.1** Explain why different types of information might need to be protected.	
	Nouns	**Verbs**
	information *types*	*explain*
Clarifying Statement	The emphasis is on discussing different reasons that adversaries may want to obtain, compromise, or leverage different types of information. At this stage, students should be focused on general concepts.	
Focus Questions	*What information should be protected?* *Why should we protect any of our information?* *What information should be protected?* *What information should I NEVER share online?* *Who might want to use my information for negative purposes?* *How could my leaked information harm me?* *What are the consequences of sharing too much information?*	
Academic Language	*Information security* *Data protection* *Confidentiality* *Integrity* *Availability*	*Privacy* *Cybersecurity* *Sensitive information* *Personal data* *Financial information*	*Intellectual property* *Trade secrets* *Passwords* *Encryption* *Access control*
NYSED Examples	Example 1: Students could discuss the type of data needed for different adversarial behaviors such as information that can be used for identity theft, cyberbullying, political influence, or ransomware attacks.	
Interdisciplinary Connections	***Mathematics***: • ***Data Encryption***: *Introducing basic concepts of cryptography and encryption methods used to protect sensitive information, discussing how mathematical algorithms can secure data.* • ***Statistics***: *Analyzing data breaches and cybersecurity incidents using statistical tools to understand the frequency and impact of information leaks, emphasizing the importance of protecting data.* • ***Probability***: *Discussing the likelihood of data breaches and cyberattacks, exploring how probability concepts relate to assessing risks and implementing protective measures.* ***Language Arts***:	

- ***Writing for Understanding***: *Writing persuasive essays or informative texts that explain the importance of protecting different types of information, using evidence and examples to support arguments.*
- ***Reading Comprehension***: *Reading age-appropriate articles or stories about historical events or current news related to data breaches and cybersecurity, discussing comprehension and critical thinking about digital privacy.*
- ***Debates and Discussions***: *Engaging in debates or discussions about ethical dilemmas and privacy concerns in protecting personal information online, exploring diverse perspectives and solutions.*

Science:

- ***Technology and Society***: *Investigating the impact of technology on society, discussing ethical considerations and societal implications of data privacy and protection.*
- ***Information Security***: *Learning about cybersecurity principles and practices, exploring how scientific knowledge is applied to develop secure systems and protocols for protecting information.*
- ***Environmental Science***: *Discussing the environmental impacts of data storage and security practices, exploring sustainability concerns related to digital infrastructure and energy consumption.*

Social Studies/ Civics:

- ***Legal and Ethical Issues***: *Studying laws and regulations related to data protection and privacy rights, discussing the role of government and individual responsibilities in safeguarding information.*
- ***Global Perspectives***: *Exploring international perspectives on data privacy and protection, comparing different cultural norms and legal frameworks governing information security.*
- ***Digital Citizenship***: *Learning about rights and responsibilities as digital citizens, including concepts of online safety, respect for privacy, and ethical behavior in digital environments.*

Digital Literacy/ Technology Education:

- ***Cybersecurity Basics***: *Learning about common cybersecurity threats (e.g., phishing, malware) and protective measures (e.g., strong passwords, two-factor authentication) to safeguard personal information.*
- ***Data Management***: *Understanding principles of data storage, encryption, and backup strategies, exploring how technology tools are used to manage and protect information.*

	• ***Ethical Hacking***: *Exploring ethical considerations in cybersecurity through simulated activities or games that demonstrate the importance of ethical behavior in protecting digital assets.* ***Art***: • ***Visual Representation***: *Creating posters, infographics, or digital artworks that visually communicate the importance of protecting different types of information, using symbols and illustrations to convey key concepts.* • ***Digital Storytelling***: *Developing multimedia projects or animations that tell stories about the consequences of data breaches and the significance of data protection, engaging creativity and digital media skills.* • ***Collaborative Projects***: *Collaborating on art installations or exhibitions that raise awareness about cybersecurity and privacy issues, integrating artistic expression with informational content for broader community impact.* ***Health Education***: • ***Personal Health Information***: *Discussing the importance of confidentiality and security in healthcare settings, exploring how electronic health records (EHR) and medical data are protected.* • ***Mental Health***: *Exploring the impact of cyberbullying and online harassment on mental well-being, discussing strategies for protecting personal information and promoting positive digital interactions.* • ***Digital Safety***: *Learning about strategies for maintaining digital hygiene, including tips for protecting personal information and recognizing potential risks in online environments.* ***Ethics and Philosophy***: • ***Ethical Decision-Making***: *Engaging in discussions about ethical dilemmas related to data privacy and security, exploring values and principles that guide responsible behavior in protecting information.* • ***Philosophical Inquiry***: *Reflecting on philosophical questions about privacy rights, digital identity, and the ethical implications of data collection and surveillance in a digital society.* • ***Values Exploration***: *Exploring personal values and beliefs related to privacy and information security, discussing how ethical considerations influence decisions about sharing and protecting information online.*
Additional Examples and	*Students make a presentation/pamphlet to share information on the "Dos and Don'ts"*

Cybersecurity: Risks

Resources	*Students list types of information that is too personal to share* *Students role-play events or how to manage when information is requested or asked for (tell a parent/block user)* *What should you do if you hear that someone is cyber bullying you or someone else? Who should you report to?*

Cybersecurity: Safeguards

<table>
<tr><td rowspan="3">Standard</td><td colspan="2">4-6.CY.2 Describe common safeguards for protecting personal information.</td></tr>
<tr><td>Nouns</td><td>Verbs</td></tr>
<tr><td>safeguards
personal information</td><td>describe</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">The emphasis is on describing common safeguards such as protecting devices and accounts with strong passwords, keeping software updated, and not sending sensitive information over SMS.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">What is personal information?
How do I protect my personal information?
What are examples of safeguards?
Why might safeguards be important to help protect personal information?
What are good and not good passwords to use?
Why do we want our accounts to have a strong password?
How can you make sure your software is updated?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Personal information
Data protection
Privacy
Safeguards
Encryption
Data backups
Data backups

Password protection
Two-factor authentication
Firewalls
Antivirus software
Secure sockets layer (SSL)

Permission settings
Secure login
Data minimization</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students could create a guide to everyday digital security safeguards for students in another grade. The guide could teach them how to implement different safeguards in the classroom and at home. (ELA)</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Mathematics:

• Data Security Measures: Introducing basic statistical concepts to analyze the effectiveness of different safeguards (e.g., passwords, encryption) in protecting personal information.
• Probability: Exploring the likelihood of data breaches and cyberattacks, discussing how understanding probabilities can inform decisions about implementing security measures.
• Graphing and Charts: Creating graphs or charts to compare the strength of different passwords or the frequency of phishing attempts, emphasizing data visualization skills in understanding security risks.

Language Arts:</td></tr>
</table>

- ***Writing for Understanding***: *Writing informative essays or guides that explain common safeguards for protecting personal information, using clear language and examples suitable for their grade level.*
- ***Reading Comprehension***: *Reading age-appropriate articles or stories about cybersecurity and privacy issues, discussing comprehension and critical thinking about digital safety.*
- ***Debates and Discussions***: *Engaging in debates or discussions about ethical considerations and personal responsibility in protecting online privacy, exploring diverse viewpoints and solutions.*

Science:

- ***Technology and Security***: *Learning about the science behind encryption and secure data transmission, discussing scientific principles used to develop cybersecurity safeguards.*
- ***Environmental Science***: *Discussing the environmental impacts of digital technologies used to protect personal information, exploring sustainability concerns related to data storage and security.*
- ***Health and Safety***: *Exploring how cybersecurity measures protect personal health information in healthcare settings, discussing the importance of confidentiality and patient privacy.*

Social Studies/ Civics:

- ***Legal Frameworks***: *Studying laws and regulations related to data protection and privacy rights, discussing the role of government and individual responsibilities in safeguarding personal information.*
- ***Global Perspectives***: *Exploring international perspectives on data privacy and cybersecurity, comparing different cultural norms and legal frameworks governing information security.*
- ***Digital Citizenship***: *Learning about rights and responsibilities as digital citizens, including concepts of online safety, respect for privacy, and ethical behavior in digital environments.*

Digital Literacy/ Technology Education:

- ***Cybersecurity Basics***: *Learning about common cybersecurity threats (e.g., phishing, malware) and protective measures (e.g., strong passwords, two-factor authentication) to safeguard personal information.*
- ***Data Management***: *Understanding principles of data encryption, backup strategies, and secure online behaviors, exploring how technology tools are used to manage and protect information.*

	• ***Ethical Hacking**: Exploring ethical considerations in cybersecurity through simulated activities or games that demonstrate the importance of ethical behavior in protecting digital assets.* ***Art**:* • ***Visual Representation**: Creating posters, infographics, or digital artworks that visually communicate common safeguards for protecting personal information, using symbols and illustrations to convey key concepts.* • ***Digital Storytelling**: Developing multimedia projects or animations that tell stories about the consequences of data breaches and the importance of data protection, engaging creativity and digital media skills.* • ***Collaborative Projects**: Collaborating on art installations or exhibitions that raise awareness about cybersecurity and privacy issues, integrating artistic expression with informational content for broader community impact.* ***Health Education**:* • ***Personal Health Information**: Discussing the importance of confidentiality and security in healthcare settings, exploring how electronic health records (EHR) and medical data are protected.* • ***Mental Health**: Exploring the impact of cyberbullying and online harassment on mental well-being, discussing strategies for protecting personal information and promoting positive digital interactions.* • ***Digital Safety**: Learning about strategies for maintaining digital hygiene, including tips for protecting personal information and recognizing potential risks in online environments.* ***Ethics and Philosophy**:* • ***Ethical Decision-Making**: Engaging in discussions about ethical dilemmas related to data privacy and security, exploring values and principles that guide responsible behavior in protecting information.* • ***Philosophical Inquiry**: Reflecting on philosophical questions about privacy rights, digital identity, and the ethical implications of data collection and surveillance in a digital society.* • ***Values Exploration**: Exploring personal values and beliefs related to privacy and information security, discussing how ethical considerations influence decisions about sharing and protecting information online.*
Additional Examples and Resources	*-Creating a T-chart that describes what is personal information and what may not be and why or why not* *-create good and bad passwords and explain why they are good and bad.*

Cybersecurity: Safeguards

	-History of adaptations of passwords and why *-Students could create a powerpoint or slideshow showcasing how to best protect oneself.* *-Students could create a list of the potential uses of safeguards and how it protects us and our information.* *-Go over what are some examples of good passwords, using capital letters, numbers and symbols.* *-Talk about not using birth dates, your name, relatives names, or pet names as your password.* *-Have older kids go and talk to younger kids about the importance of safeguards.*

Cybersecurity: Safeguards

<table>
<tr><td>Standard</td><td colspan="3">4-6.CY.3 Describe trade-offs between allowing information to be public and keeping information private and secure.</td></tr>
<tr><td></td><td colspan="2">Nouns</td><td>Verbs</td></tr>
<tr><td></td><td colspan="2">trade-offs
information
public
private
secure</td><td>describe</td></tr>
<tr><td>Clarifying Statement</td><td colspan="3">The focus is on considering the trade-offs of data sharing in different contexts.</td></tr>
<tr><td>Focus Questions</td><td colspan="3">What is public versus private?
What could the trade-offs be?
What are the pros and cons of public versus private?
Can we guarantee information we share privately will stay private?
What are the advantages of both?
Why would information be private versus public?
What might be the consequences of private information becoming public?</td></tr>
<tr><td>Academic Language</td><td>Trade-offs
Public information
Privacy
Security
Confidentiality</td><td>Accessibility
Transparency
Risks
Benefits
Data exposure</td><td>Data breach
Data integrity
Data ownership
Data sharing
Data protection</td></tr>
<tr><td>NYSED Examples</td><td colspan="3">Example 1: Students could list the pros and cons of sharing pictures and information about their activities on social media.
Example 2: Share examples of viral moments and how the people are impacted. Explain what “clickbait” is and show examples of it.
Example 3: Students can discuss ads they see that might be too good to be true. Students can also discuss scams and how they try and trick you to give information.</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="3">Mathematics:
• Probability and Risk Assessment: Introducing basic concepts of probability to discuss the likelihood of privacy breaches versus benefits of public information sharing, using simple probability scenarios to illustrate trade-offs.</td></tr>
</table>

- ***Data Analysis****: Analyzing data related to privacy breaches and public information sharing, using charts or graphs to visualize trade-offs and understand implications of data security measures.*

Language Arts*:*

- ***Writing and Communication****: Writing persuasive essays or arguments discussing the advantages and disadvantages of public versus private information, using evidence and examples to support viewpoints.*
- ***Reading Comprehension****: Reading age-appropriate articles or stories about real-world scenarios involving privacy issues and public information, engaging in discussions to analyze different perspectives.*
- ***Debates and Discussions****: Engaging in debates about ethical considerations and personal responsibilities related to privacy and public information, exploring diverse viewpoints and potential solutions.*

Science*:*

- ***Technology and Society****: Investigating how technological advancements affect privacy rights and public information sharing, discussing scientific principles behind data encryption and secure communication methods.*
- ***Ethical Dilemmas****: Exploring ethical dilemmas in scientific research and data collection, discussing trade-offs between transparency and protecting individual privacy.*
- ***Environmental Science****: Discussing environmental impacts of digital technologies used to manage public and private information, exploring sustainability concerns related to data storage and security.*

Social Studies/ Civics*:*

- ***Legal Frameworks****: Studying laws and regulations related to privacy rights and public information access, discussing the role of government and individual responsibilities in balancing transparency with data protection.*
- ***Global Perspectives****: Exploring international perspectives on data privacy and cybersecurity, comparing different cultural norms and legal frameworks governing information security.*
- ***Digital Citizenship****: Learning about rights and responsibilities as digital citizens, including concepts of online safety, respect for privacy, and ethical behavior in digital environments.*

Digital Literacy/ Technology Education*:*

- ***Cybersecurity Basics***: *Learning about common cybersecurity threats (e.g., phishing, identity theft) and protective measures (e.g., password security, privacy settings) to safeguard personal information.*
- ***Data Management***: *Understanding principles of data encryption, backup strategies, and secure online behaviors, exploring how technology tools are used to manage and protect information.*
- ***Ethical Hacking***: *Exploring ethical considerations in cybersecurity through simulated activities or games that demonstrate the importance of ethical behavior in protecting digital assets.*

Art:

- ***Visual Representation***: *Creating posters, infographics, or digital artworks that visually communicate trade-offs between public information sharing and privacy protection, using symbols and illustrations to convey key concepts.*
- ***Digital Storytelling***: *Developing multimedia projects or animations that tell stories about the consequences of privacy breaches and the importance of data protection, engaging creativity and digital media skills.*
- ***Collaborative Projects***: *Collaborating on art installations or exhibitions that raise awareness about cybersecurity and privacy issues, integrating artistic expression with informational content for broader community impact.*

Health Education:

- ***Personal Health Information***: *Discussing the importance of confidentiality and security in healthcare settings, exploring how electronic health records (EHR) and medical data are protected.*
- ***Mental Health***: *Exploring the impact of cyberbullying and online harassment on mental well-being, discussing strategies for protecting personal information and promoting positive digital interactions.*
- ***Digital Safety***: *Learning about strategies for maintaining digital hygiene, including tips for protecting personal information and recognizing potential risks in online environments.*

Ethics and Philosophy:

- ***Ethical Decision-Making***: *Engaging in discussions about ethical dilemmas related to data privacy and security, exploring values and principles that guide responsible behavior in protecting information.*

	• ***Philosophical Inquiry***: *Reflecting on philosophical questions about privacy rights, digital identity, and the ethical implications of data collection and surveillance in a digital society.* • ***Values Exploration***: *Exploring personal values and beliefs related to privacy and information security, discussing how ethical considerations influence decisions about sharing and protecting information online.*
Additional Examples and Resources	*Students identify online activities that they consider "safe" but could in fact be collecting personal information (what do you like to respond to online, what questions do you like to interact with?)* *Post a facebook comment/picture to say the class is doing an experiment and have people comment on it to see where they are from and how fast the post is being shared. This will demonstrate how quickly and how far information can be spread online.* *Students can investigate different websites or social media and explain what could be changed to keep the user safe* *Discuss the importance of once anything is shared online, you can still find it, even if it is deleted.* *Discuss the importance of looking at an email, and making sure it is safe, before opening it.*

Cybersecurity: Safeguards

Standard	**4-6.CY.4** Model and explain the purpose of simple cryptographic methods.	
	Nouns	**Verbs**
	cryptographic methods	*model* *explain*
Clarifying Statement	The focus is on using ciphers to encrypt and decrypt messages as a means of safeguarding data.	
Focus Questions	*What is a cryptographic method?* *What is the purpose of encrypting data?* *How can we encrypt information?* *What information should we encrypt?* *Why should we encrypt information?*	
Academic Language	*Cryptography* *Encryption* *Decryption* *Cipher* *Plaintext* *Ciphertext* *Key* *Symmetric encryption* *Asymmetric encryption* *Public key* *Private key* *Cryptosystem* *Algorithm* *Security* *Confidentiality*	
NYSED Examples	Example 1: Students could use a cipher or Vigenere Square to encrypt a message for a classmate. the classmate can use the same cipher to decrypt the message.	
Interdisciplinary Connections	***Mathematics***: • ***Number Systems***: *Exploring number systems (e.g., binary) and how they relate to cryptographic algorithms, introducing basic concepts of encoding and decoding messages using numerical values.* • ***Patterns and Sequences***: *Investigating patterns in cryptographic algorithms (e.g., Caesar cipher), understanding how mathematical patterns are used to encrypt and decrypt messages.* • ***Probability***: *Discussing the likelihood of breaking simple cryptographic methods (e.g., frequency analysis in substitution ciphers), applying basic probability concepts to understand vulnerabilities in encryption.* ***Language Arts***: • ***Writing and Communication***: *Writing explanations or instructions on how simple cryptographic methods work, using clear language and examples to demonstrate the purpose and effectiveness of encryption.* • ***Reading Comprehension***: *Reading age-appropriate stories or historical accounts where cryptography played a role (e.g., during wars or in*	

espionage), discussing comprehension and critical thinking about encryption techniques.

- ***Creative Writing**: Writing stories or messages using simple cryptographic methods, engaging in decoding activities to understand how encryption adds intrigue and secrecy to communication.*

***Science**:*

- ***Technology and Society**: Investigating the historical development of cryptography and its impact on communication and security, discussing scientific principles behind encryption techniques.*
- ***Chemistry**: Exploring the concept of "invisible ink" as a form of cryptography, experimenting with homemade invisible inks and discussing chemical reactions involved in revealing hidden messages.*
- ***Physics**: Explaining concepts of light and optics in relation to cryptography (e.g., using polarized filters to decode messages hidden in images), exploring how scientific principles are applied in encryption methods.*

***Social Studies/ Civics**:*

- ***Historical Context**: Studying historical events where cryptography played a significant role (e.g., World War II Enigma machine), discussing ethical implications and societal impacts of secure communication methods.*
- ***Legal and Ethical Issues**: Discussing laws and regulations related to encryption and privacy rights, exploring the balance between national security and individual privacy in the context of cryptography.*
- ***Global Perspectives**: Exploring international perspectives on encryption laws and policies, comparing different cultural attitudes toward privacy and data security.*

***Digital Literacy/ Technology Education**:*

- ***Cybersecurity Basics**: Learning about common cryptographic algorithms (e.g., Caesar cipher, ROT13) and their applications in securing digital information.*
- ***Data Management**: Understanding the importance of data encryption in protecting personal information online, exploring tools and techniques used to encrypt and decrypt messages.*
- ***Ethical Hacking**: Exploring ethical considerations in cybersecurity through simulated activities or games that demonstrate the importance of encryption in protecting digital assets.*

***Art**:*

	• ***Visual Representation***: *Creating posters, infographics, or digital artworks that visually explain simple cryptographic methods, using symbols and illustrations to depict encryption processes.* • ***Digital Storytelling***: *Developing multimedia projects or animations that tell stories about the historical or fictional use of cryptography, engaging creativity and digital media skills.* • ***Collaborative Projects***: *Collaborating on art installations or exhibitions that raise awareness about the role of cryptography in history and modern technology, integrating artistic expression with informational content.* ***Health Education***: • ***Privacy and Security***: *Discussing the importance of confidentiality and security in healthcare settings, exploring how encryption methods protect sensitive patient information.* • ***Mental Health***: *Exploring the impact of digital privacy on mental well-being, discussing strategies for maintaining digital hygiene and protecting personal information online.* • ***Digital Safety***: *Learning about strategies for recognizing and mitigating risks associated with online communication, including the role of encryption in safeguarding digital interactions.* ***Ethics and Philosophy***: • ***Ethical Decision-Making***: *Engaging in discussions about ethical dilemmas related to encryption and privacy, exploring values and principles that guide responsible use of cryptographic methods.* • ***Philosophical Inquiry***: *Reflecting on philosophical questions about privacy rights, surveillance, and the ethical implications of cryptography in a digital society.* • ***Values Exploration***: *Exploring personal values and beliefs related to digital privacy and security, discussing how ethical considerations influence decisions about encryption and data protection online.*
Additional Examples and Resources	*Students create their own riddle using a cipher* *Students could create math review worksheets that have riddles that are encrypted and can only be solved when correctly solving the math problems* *Hidden messages in math problems*

	Make a code using math problems. Students have to first solve the math problems. Each number is a letter that will make a hidden message. (Math) *Math and ELA - encryption activities* *Native American Code talkers - (Navajo) CKLA Unit 8 (Grade 5)* *https://www.nationalww2museum.org/war/articles/american-indian-code-talkers*

Cybersecurity: Response

Standard	**4-6.CY.5** Explain suspicious activity of applications and devices.	
	Nouns	**Verbs**
	suspicious *activity* *applications* *devices*	*explain*
Clarifying Statement	The emphasis is on describing simple forms of suspicious behavior in common applications and devices, including suspicious data/links, viruses and malware.	
Focus Questions	*How can we identify suspicious activity within an app or device?* *What should I do if I think there is suspicious activity?* *What is an example of suspicious activity?* *What does suspicious activity look like?* *How would you know if something is suspicious with (email, app, video etc.)* *What suspicious behavior and activity do you have to look out for?* *What will a virus do to your computer?*	
Academic Language	*Suspicious activity* *Anomaly detection* *Malware* *Virus* *Trojan horse*	*Spyware* *Adware* *Phishing* *Cyberattack* *Intrusion*	*Unauthorized access* *Data breach* *Security threat* *Abnormal behavior* *Red flags*
NYSED Examples	Example 1: Students could review sample email messages and describe features that suggest suspicious behavior. Example 2: Have students research how to recognize “spam” and create a warning guide.	
Interdisciplinary Connections	***Mathematics***: • ***Data Analysis***: *Learning to analyze data logs or activity records from devices and applications to identify patterns of suspicious behavior, using basic statistical tools to recognize anomalies.* • ***Probability***: *Discussing the likelihood of encountering suspicious activity in digital environments, exploring how probability concepts can help assess risks and make informed decisions about online safety.* • ***Graphing and Charts***: *Creating visual representations (e.g., bar graphs, pie charts) to illustrate different types of suspicious activities detected in device or application logs, enhancing data visualization skills.* ***Language Arts***:	

- ***Writing and Communication***: *Writing reports or explanations that describe common signs of suspicious activity in applications and devices, using clear language and examples appropriate for their grade level.*
- ***Reading Comprehension***: *Reading age-appropriate articles or stories about cybersecurity incidents involving suspicious activity, engaging in discussions to analyze comprehension and critical thinking about digital safety.*
- ***Creative Writing***: *Writing narratives or scenarios where characters encounter suspicious activity on their devices, exploring the importance of vigilance and responsible online behavior.*

Science:

- ***Technology and Society***: *Investigating how technological advancements contribute to detecting and mitigating suspicious activity in applications and devices, discussing scientific principles behind cybersecurity measures.*
- ***Environmental Science***: *Discussing environmental impacts of digital technologies used to monitor and protect against suspicious activity, exploring sustainability concerns related to digital infrastructure and energy consumption.*
- ***Health and Safety***: *Exploring how suspicious activity detection enhances personal safety and privacy in healthcare settings, discussing the role of technology in safeguarding sensitive information.*

Social Studies/ Civics:

- ***Legal and Ethical Issues***: *Studying laws and regulations related to cybersecurity and privacy rights, discussing the role of government and individual responsibilities in reporting and addressing suspicious activity.*
- ***Global Perspectives***: *Exploring international perspectives on cybersecurity measures and responses to suspicious activity, comparing different cultural norms and legal frameworks governing digital security.*
- ***Digital Citizenship***: *Learning about rights and responsibilities as digital citizens, including concepts of online safety, respect for privacy, and ethical behavior in digital environments.*

Digital Literacy/ Technology Education:

- ***Cybersecurity Basics***: *Learning about common signs of suspicious activity (e.g., unusual network traffic, unauthorized access attempts) and preventive measures to protect devices and data.*

- ***Data Management***: *Understanding principles of data monitoring and logging in detecting suspicious activity, exploring tools and techniques used to monitor device and application behavior.*
- ***Ethical Hacking***: *Exploring ethical considerations in cybersecurity through simulated activities or games that demonstrate the importance of identifying and responding to suspicious activity.*

Art:

- ***Visual Representation***: *Creating posters, infographics, or digital artworks that visually depict common signs of suspicious activity in applications and devices, using symbols and illustrations to raise awareness.*
- ***Digital Storytelling***: *Developing multimedia projects or animations that tell stories about cybersecurity incidents involving suspicious activity, engaging creativity and digital media skills.*
- ***Collaborative Projects***: *Collaborating on art installations or exhibitions that educate peers and community members about digital safety and the importance of detecting and reporting suspicious activity.*

Health Education:

- ***Privacy and Security***: *Discussing the importance of confidentiality and security in healthcare settings, exploring how suspicious activity detection protects patient information and promotes trust.*
- ***Mental Health***: *Exploring the impact of digital safety on mental well-being, discussing strategies for maintaining digital hygiene and responding to suspicious online behavior.*
- ***Digital Safety***: *Learning about strategies for recognizing and mitigating risks associated with suspicious activity on devices and applications, promoting responsible digital citizenship.*

Ethics and Philosophy:

- ***Ethical Decision-Making***: *Engaging in discussions about ethical dilemmas related to cybersecurity and privacy, exploring values and principles that guide responsible behavior in detecting and reporting suspicious activity.*
- ***Philosophical Inquiry***: *Reflecting on philosophical questions about privacy rights, surveillance, and the ethical implications of monitoring digital activities to detect suspicious behavior.*
- ***Values Exploration***: *Exploring personal values and beliefs related to digital safety and security, discussing how ethical considerations*

	influence decisions about detecting and responding to suspicious activity online.
Additional Examples and Resources	*Students create a kahoot with examples of suspicious activity and see if students can determine which ones are sus and not* *Is there a "Know Before" type training aimed at students?* *4th and 5th graders can make a doc for the younger grades (2nd or 3rd), then go and explain to them what to look out for when getting emails.* *https://phishingquiz.withgoogle.com/*

Digital Literacy

Digital literacy is a multifaceted concept that extends beyond skills-based activities and incorporates both cognitive and technical skills. It refers to the ability to leverage computer technology to appropriately access digital information; to create, share, and modify artifacts, and to interact and collaborate with others. Digital literacy includes understanding the benefits and implications of using digital technologies to be successful in our contemporary world.

Digital Literacy: Digital Use

Standard	**4-6.DL.1** Type on a keyboard while demonstrating proper keyboarding technique.	
	Nouns	**Verbs**
	keyboard *technique*	*type* *demonstrate*
Clarifying Statement	The focus is on direct instruction in keyboarding. Instruction should focus on form over speed and accuracy.	
Focus Questions	*What is the proper form when keyboarding?* *Why is using the proper technique important?* *Why practice and learn typing?*	
Academic Language	*Keyboarding* *Typing* *Keyboard layout* *Home row* *Touch typing*	*Fingers placement* *Hand position* *Posture* *Typing speed* *Accuracy*	*Key placement* *Muscle memory* *Typing rhythm* *Typing fluency* *Ergonomics*
NYSED Examples	Example 1: Students use a school-selected online keyboarding program to learn the fundamentals of keyboarding. Example 2: Students analyze their rate progress and letters that are challenging using data produced by the program. They can then create a presentation using those data to show their progress.	
Interdisciplinary Connections	***Language Arts***: • ***Writing Skills***: *Using proper keyboarding technique to compose essays, stories, or reports, focusing on accuracy, speed, and organization of thoughts.* • ***Grammar and Spelling***: *Practicing typing exercises that reinforce correct grammar and spelling, emphasizing the importance of editing and proofreading digital texts.* • ***Creative Writing***: *Engaging in typing activities to develop creativity and expression through digital storytelling or poetry writing, using keyboarding skills to enhance writing fluency.* ***Mathematics***: • ***Data Entry***: *Using keyboarding skills to input numerical data into spreadsheets or math software, practicing accuracy and efficiency in handling mathematical computations.*	

- ***Problem-Solving****: Solving math problems online or through educational games that require typing responses, reinforcing computational skills while improving typing proficiency.*

Science*:*

- ***Research Skills****: Using proper keyboarding technique to search for information online, navigating science websites and databases to gather research materials for experiments or projects.*
- ***Data Collection****: Typing lab reports or scientific observations using digital tools, focusing on precision in recording data and presenting findings.*

Social Studies/ Civics*:*

- ***Digital Citizenship****: Practicing safe and responsible keyboarding habits while engaging in online discussions or collaborative projects related to social studies topics.*
- ***Research and Documentation****: Typing citations and bibliographies according to research standards, demonstrating proper attribution and academic integrity in digital writing.*

Digital Literacy/ Technology Education*:*

- ***Keyboarding Skills****: Learning and practicing touch typing techniques through interactive typing tutorials and games, improving speed and accuracy on the keyboard.*
- ***File Management****: Typing file names and organizing digital documents in folders, practicing efficient file management skills to locate and retrieve information.*

Art*:*

- ***Digital Art and Design****: Using keyboarding skills to create digital artwork or graphic designs using software programs, focusing on precision and creativity in digital media projects.*
- ***Typography****: Exploring different fonts and typography styles through typing exercises, learning how to enhance visual communication using text and keyboarding techniques.*

Health Education*:*

- ***Ergonomics****: Practicing proper posture and hand positioning while typing, discussing ergonomic principles to prevent strain and promote physical well-being during keyboarding activities.*

	• ***Digital Wellness**: Learning about the balance between screen time and physical activity, incorporating regular breaks and stretches while practicing keyboarding skills.* ***Physical Education**:* • ***Hand-eye Coordination**: Practicing typing games or exercises that enhance hand-eye coordination and fine motor skills, integrating physical education principles with digital literacy activities.*
Additional Examples and Resources	*Have students put boxes/paper sheets over their hands/keyboards to see if they can type without looking down*

Digital Literacy: Digital Use

<table>
<tr><td>Standard</td><td colspan="2">4-6.DL.2 Select appropriate digital tools to communicate and collaborate while learning with others.</td></tr>
<tr><td rowspan="2"></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td>tools</td><td>Select
Communicate
Collaborate</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">Students progress from understanding that people use digital tools to communicate and collaborate to how they use the tools. Communication and collaboration should be purposeful and, when possible and appropriate, with an authentic audience.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">What is an appropriate tool to communicate with your peers?
What is an appropriate tool to communicate with teachers?
What are different tools that can be used to communicate with others?
How can we make communication and collaboration purposeful?
How can we determine if a digital tool is appropriate and useful?
How are digital tools used?
What digital tools do you use to communicate?
What are the consequences for not being appropriate with the digital tools?
How is technology and communication today different from 30 years ago?
How can computer technology improve collaboration?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Digital tools
Communication
Collaboration
Online platforms
Messaging apps
Video conferencing
Email
Social media
Shared documents
Online forums
Virtual classrooms
Collaboration software
File sharing
Screen sharing
Webinars</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students use a school-approved digital tool to type a request to an expert (author, zoologist, museum curator), asking him or her to speak to their classroom; collaboratively generate a list of questions to ask; and connect with the expert over a digital conferencing tool.
Example 2: Students use a shared online document to provide feedback on peers' work and track changes over time.
Example 3: Students can use email in an appropriate manner to ask a teacher or other school professional a question. They can state when it is appropriate to email someone versus instant message versus phone call.</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Language Arts:</td></tr>
</table>

- ***Digital Writing Tools***: *Using word processing software (e.g., Google Docs, Microsoft Word) to collaborate on writing assignments, practicing editing and revising skills collaboratively.*
- ***Digital Storytelling Platforms***: *Exploring platforms (e.g., Storybird, Book Creator) to create and share digital stories with peers, enhancing narrative skills and creativity in storytelling.*
- ***Online Discussions***: *Participating in online forums or discussion boards to analyze literature or share opinions on reading assignments, developing critical thinking and communication skills.*

Mathematics:

- ***Mathematics Software***: *Using interactive math tools (e.g., GeoGebra, Mathletics) to collaborate on solving math problems or exploring mathematical concepts visually.*
- ***Graphing Tools***: *Utilizing digital graphing tools (e.g., Desmos, Graphmatica) to create and analyze graphs collaboratively, reinforcing data interpretation and visualization skills.*
- ***Math Games***: *Engaging in online math games and simulations that encourage collaborative problem-solving and strategic thinking.*

Science:

- ***Virtual Labs***: *Accessing virtual lab platforms (e.g., PhET Interactive Simulations, ExploreLearning Gizmos) to conduct experiments and explore scientific concepts with peers.*
- ***Collaborative Research***: *Using digital research tools (e.g., Google Scholar, National Geographic Kids) to gather information and collaborate on science projects or presentations.*
- ***Science Journals***: *Creating digital science journals or notebooks using tools like Google Slides or Microsoft OneNote to document observations and findings collaboratively.*

Social Studies/ Civics:

- ***Interactive Maps***: *Using digital mapping tools (e.g., Google Maps, National Geographic MapMaker Interactive) to explore geography and historical events collaboratively.*
- ***Digital Timelines***: *Creating interactive timelines (e.g., Timeline JS, Tiki-Toki) to chronologically sequence historical events and share findings with peers.*
- ***Virtual Tours***: *Engaging in virtual tours of historical sites or museums using online platforms (e.g., Google Arts & Culture, Smithsonian Virtual Tours) to enhance understanding of cultural and historical contexts.*

	***Digital Literacy/ Technology Education**:* • ***Digital Collaboration Platforms**: Using collaborative tools (e.g., Google Workspace for Education, Microsoft Teams) to share documents, communicate in real-time, and work together on projects.* • ***Coding and Programming**: Collaborating on coding projects using educational platforms (e.g., Scratch, Code.org) to learn programming concepts and create interactive digital artifacts.* • ***Digital Citizenship**: Discussing responsible use of digital tools, including etiquette, privacy, and safety considerations when communicating and collaborating online.* ***Art**:* • ***Digital Art Creation**: Collaborating on digital art projects using software like Adobe Creative Cloud or online drawing tools (e.g., Sketchpad, Pixlr), exploring creativity and visual expression.* • ***Digital Design**: Using graphic design tools (e.g., Canva, PicMonkey) to create posters, infographics, or multimedia presentations collaboratively, integrating artistic elements with academic content.* ***Health Education**:* • ***Wellness Apps**: Exploring wellness apps or digital tools (e.g., Calm, Headspace) to practice mindfulness and promote mental well-being collaboratively with peers.* • ***Digital Health Resources**: Accessing reliable health information online and collaborating on projects related to nutrition, fitness, and healthy lifestyles using digital tools.* • ***Health Campaigns**: Collaboratively designing digital health campaigns or presentations using multimedia tools to raise awareness about health issues within the school community.* ***Physical Education**:* • ***Fitness Tracking Apps**: Using fitness tracking apps or digital tools (e.g., Fitbit, Strava) to set fitness goals, track progress, and collaborate on personal wellness challenges with peers.* • ***Online Fitness Classes**: Participating in virtual fitness classes or tutorials using online platforms (e.g., YouTube, fitness apps) to promote physical activity and teamwork.*
Additional Examples and Resources	*Pen pals using technology to communicate*

	Exposing students to the different digital tools they have available to them so that they can select the appropriate one to use given the task at hand. Being explicit about showing or demonstrating the different digital tools we use as teachers so students know what they could pick from. *Students use Google Meet to present their work to peers in other schools or districts*

Digital Literacy: Digital Use

<table>
<tr><td>Standard</td><td colspan="2">4-6.DL.3 Conduct and refine advanced multi-criteria digital searches to locate content relevant to varied learning goals.</td></tr>
<tr><td></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td></td><td>Digital searches
Content
Learning goals</td><td>Conduct
Refine</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">Focus should be on the quality of results a search generates, and how to improve search results based on the task or purpose by defining multiple search criteria and using filters.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">What is the best way to get results when doing an online search?
How can I refine my search using a search engine? (i.e. Google)
How can I recognize if content is relevant to my search?
How can we identify if our digital searches are accurate?
How do I know if a site is a trustworthy and accurate website to find relevant information?
What should I type in the search bar to get the best results?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Digital searches
Search engine
Keywords
Boolean operators
Advanced search techniques
Filters
Refinement
Relevance
Learning goals
Information retrieval
Query
Search results
Ranking
Metadata
Search algorithms</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students search for articles published after 2018 and pictures licensed under the Creative Commons Non-Commercial license to create a presentation on endangered ecosystems. (SCIENCE)
Example 2: Students can create an Explain Anything video to show the steps in a science experiment and display the artifacts in the process. (SCIENCE) Example 3: Students can use a search to find information on their town history and share with the class. (SOCIAL STUDIES)</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Language Arts:
• Research Skills: Using advanced search techniques to find diverse sources (e.g., articles, websites, videos) related to literary topics or genres, refining searches to locate specific information for writing assignments.</td></tr>
</table>

- ***Information Literacy***: *Learning to evaluate the credibility and relevance of digital sources found through multi-criteria searches, practicing citation and referencing skills for academic integrity.*
- ***Digital Storytelling***: *Incorporating multimedia content (e.g., images, audio clips) discovered through digital searches into storytelling projects, enhancing narrative and presentation skills.*

Mathematics:

- ***Problem-Solving***: *Conducting digital searches to find mathematical resources (e.g., tutorials, interactive tools) that support problem-solving and exploration of mathematical concepts beyond the classroom.*
- ***Data Analysis***: *Using advanced search techniques to find statistical data and graphs related to mathematical investigations or real-world applications, analyzing and interpreting findings collaboratively.*
- ***Math Games***: *Exploring educational games and simulations discovered through digital searches to reinforce mathematical skills and concepts in an interactive format.*

Science:

- ***Virtual Labs and Simulations***: *Conducting digital searches to find virtual labs, simulations, and interactive models that illustrate scientific phenomena or experiments, enhancing understanding of scientific concepts.*
- ***Research Projects***: *Using advanced search strategies to locate peer-reviewed articles, scientific journals, and reputable websites for research projects on various scientific topics or inquiry-based investigations.*
- ***STEM Challenges***: *Discovering STEM challenges and engineering resources through digital searches to engage in hands-on activities that integrate science, technology, engineering, and mathematics.*

Social Studies/ Civics:

- ***Historical Research***: *Conducting digital searches to locate primary sources, historical documents, and multimedia archives that support investigations into historical events, figures, and cultural perspectives.*
- ***Global Issues***: *Using advanced search techniques to find diverse viewpoints, news articles, and data related to global issues such as climate change, human rights, and geopolitical events.*
- ***Civic Engagement***: *Exploring digital resources and community initiatives discovered through searches to learn about civic responsibilities, activism, and participation in democratic processes.*

Digital Literacy/ Technology Education:

- ***Digital Citizenship***: *Learning about responsible use of digital tools and ethical considerations when conducting online searches, discussing privacy, safety, and appropriate use of information.*
- ***Information Management***: *Using digital tools and strategies to organize and manage information collected from multi-criteria searches, developing skills in data synthesis and synthesis.*
- ***Emerging Technologies***: *Exploring cutting-edge technologies and innovations discovered through digital searches, discussing their potential impact on society and future career opportunities.*

Art:

- ***Visual Research***: *Conducting digital searches to find images, artworks, and digital galleries that inspire creativity and support visual art projects, exploring different styles and techniques.*
- ***Digital Design***: *Using advanced search techniques to discover design templates, color palettes, and digital tools for creating multimedia presentations, posters, and digital artworks.*
- ***Art History***: *Exploring online resources and virtual exhibitions discovered through searches to study art history, movements, and influential artists from various cultures and time periods.*

Health Education:

- ***Health Information***: *Conducting digital searches to find reliable health information, resources, and educational materials related to nutrition, fitness, mental health, and well-being.*
- ***Digital Wellness***: *Learning strategies for managing screen time, accessing digital tools for mindfulness and stress management discovered through searches, promoting balanced lifestyles.*
- ***Health Advocacy***: *Discovering digital resources and community health initiatives through searches to learn about health advocacy, promoting healthy behaviors and informed decision-making.*

Physical Education:

- ***Fitness and Sports Resources***: *Conducting digital searches to find fitness routines, sports training videos, and coaching tips that support physical education goals and personal fitness development.*
- ***Nutrition and Wellness***: *Using advanced search techniques to locate dietary guidelines, nutritional information, and wellness resources that promote healthy living and active lifestyles.*

	• ***Teamwork and Collaboration**: Exploring online resources for team sports, group activities, and collaborative challenges discovered through digital searches to enhance teamwork skills and social interaction.*
Additional Examples and Resources	*Plenty of videos and information about how to use Google in different ways (using quotes to get only certain words, using the advanced search feature to search by years, google scholar looks up academic articles, etc…)* *Students are asked to search for certain phrases that give them mixed results or content. Students identify the results that are most closely connected to the topic, and use critical thinking skills to identify which one is the best.*

Standard	**4-6.DL.4** Use a variety of digital tools and resources to create and revise digital artifacts.	
	Nouns	**Verbs**
	variety *digital tools* *resources* *artifacts*	*use* *create* *revise*
Clarifying Statement	The focus is on understanding the editing process when creating digital artifacts on multiple platforms.	
Focus Questions	*What are digital artifacts?* *In what ways can I create a digital artifact?* *How can I revise my artifact to make it better?* *What programs can be used to create a digital artifact?* *How can I present my mathematical understanding in a digital way?* *What is the best way to merge and present findings from multiple resources?* *What tools best help me to demonstrate what I've learned?*	
Academic Language	*Digital tools* *Software applications* *Web-based platforms* *Multimedia editing* *Graphic design* *Cloud storage* *Video editing* *Audio editing* *Programming languages* *Coding environments* *Version control* *Collaboration tools* *Presentation software* *Document editors* *Online publishing platforms*	
NYSED Examples	Example 1: Students create a digital story to demonstrate understanding of a concept, such as the branches of government. (SOCIAL STUDIES)	

	Example 2: Students can show the life cycle of plants or animals using a presentation tool. (SCIENCE)
Interdisciplinary Connections	***Language Arts***: • ***Digital Writing Tools***: *Using word processing software (e.g., Google Docs, Microsoft Word) to create and revise stories, essays, and poems, focusing on editing, formatting, and collaborative writing.* • ***Multimedia Presentations***: *Using presentation software (e.g., Google Slides, Microsoft PowerPoint) to create and revise digital presentations that include text, images, and multimedia elements to enhance storytelling and communication.* • ***Interactive Storytelling***: *Using digital storytelling tools (e.g., Storybird, Book Creator) to create interactive narratives with multimedia elements, fostering creativity and engagement in writing projects.* ***Mathematics***: • ***Graphing Tools***: *Using digital graphing software (e.g., Desmos, Graphmatica) to create and revise graphs and charts for math assignments, exploring different types of data visualization techniques.* • ***Problem-Solving Apps***: *Using educational math apps (e.g., Mathletics, Prodigy) to create and revise digital artifacts that demonstrate problem-solving strategies and mathematical concepts.* • ***Digital Math Journals***: *Using digital note-taking tools (e.g., Google Keep, OneNote) to create and revise math journals that document problem-solving processes, reflections, and learning progressions.* ***Science***: • ***Virtual Labs and Simulations***: *Using interactive science simulations (e.g., PhET Interactive Simulations, ExploreLearning Gizmos) to create and revise digital artifacts that demonstrate scientific experiments, phenomena, and concepts.* • ***Digital Science Reports***: *Using word processing software and multimedia tools to create and revise digital science reports, incorporating text, images, graphs, and data analysis to communicate findings effectively.* • ***Science Videos***: *Using video editing software (e.g., iMovie, Adobe Premiere Rush) to create and revise digital videos that explain scientific concepts, experiments, or demonstrations.* ***Social Studies/ Civics***:

- ***Digital Presentations***: *Using presentation software (e.g., Google Slides, Microsoft PowerPoint) to create and revise digital presentations about historical events, geographic regions, or cultural traditions.*
- ***Interactive Maps***: *Using digital mapping tools (e.g., Google Maps, National Geographic MapMaker Interactive) to create and revise interactive maps that illustrate historical journeys, political boundaries, or environmental changes.*
- ***Digital Timelines***: *Using timeline creation tools (e.g., Timeline JS, Tiki-Toki) to create and revise digital timelines that showcase historical events, social movements, or biographical information.*

Digital Literacy/ Technology Education:

- ***Digital Artifacts***: *Using a variety of digital tools (e.g., graphic design software, multimedia editors) to create and revise digital artifacts such as infographics, posters, and digital portfolios.*
- ***Coding Projects***: *Using coding platforms (e.g., Scratch, Code.org) to create and revise interactive games, animations, or simulations that demonstrate coding concepts and problem-solving skills.*
- ***Digital Storytelling***: *Using multimedia storytelling tools (e.g., Adobe Spark, Canva) to create and revise digital stories that integrate text, images, audio, and video elements to convey narratives or concepts.*

Art:

- ***Digital Art Creation***: *Using digital drawing and painting software (e.g., Sketchpad, Pixlr) to create and revise digital artworks, exploring different artistic techniques and styles.*
- ***Digital Collage***: *Using graphic design tools (e.g., Canva, PicMonkey) to create and revise digital collages that combine images, text, and other visual elements to express artistic ideas or themes.*
- ***Interactive Art Projects***: *Using interactive art platforms (e.g., ArtSteps, Padlet) to create and revise digital art installations or exhibitions that engage viewers and convey artistic messages.*

Health Education:

- ***Digital Wellness Resources***: *Using digital tools (e.g., wellness apps, fitness trackers) to create and revise digital artifacts that promote physical and mental well-being, such as workout routines, mindfulness exercises, or nutrition guides.*
- ***Health Campaigns***: *Using multimedia tools (e.g., video editors, infographic creators) to create and revise digital campaigns or*

	presentations that raise awareness about health issues, preventive measures, or community health initiatives. • ***Personal Health Journals**: Using digital journaling tools (e.g., Google Keep, Daylio) to create and revise personal health journals that document daily activities, reflections, and goals related to physical and mental health.* ***Physical Education**:* • ***Fitness and Sports Videos**: Using video editing software (e.g., iMovie, Adobe Premiere Rush) to create and revise digital videos that demonstrate fitness routines, sports skills, or personal achievements in physical education.* • ***Digital Coaching Resources**: Using digital tools (e.g., coaching apps, sports analysis software) to create and revise digital artifacts that provide coaching tips, strategies, or feedback for improving athletic performance.* • ***Virtual Fitness Challenges**: Using interactive platforms (e.g., fitness apps, virtual fitness classes) to create and revise digital fitness challenges or workouts that promote physical activity and wellness.*
Additional Examples and Resources	*Students create digital portfolios for the year, and continue to add on to it throughout the year* *Students create slides to present their learning* *Students record videos of themselves performing a math task, reading a section of a story, conducting a science experiment, etc.*

Digital Literacy: Digital Use

Standard	**4-6.DL.5** Identify common features of digital technologies.	
	Nouns	**Verbs**
	features *technology*	*identify*
Clarifying Statement	Many digital technologies have similar features and functionalities. The focus is on identifying the similarities between different programs or applications, such as word processing tools on different platforms.	
Focus Questions	*What features do we commonly see in digital technology?* *How are they similar between different versions of technology?* *What are some useful features of google docs?* *What are the features of Microsoft word?* *How do these two tools compare and contrast?* *Why would you choose one tool over another tool?*	
Academic Language	*Digital technology* *Hardware* *Software* *User interface* *Input devices*	*Output devices* *Processor* *Memory* *Storage* *Operating system*	*Applications* *Connectivity* *Network* *Internet* *Security*
NYSED Examples	Example 1: Students start to identify similar buttons in word processing programs, or in other applications.	
Interdisciplinary Connections	***Language Arts***: • ***Digital Story Elements***: *Identifying and discussing how digital technologies (e.g., interactive eBooks, audiobooks) enhance storytelling with features like animations, sound effects, and interactive elements.* • ***Writing Tools***: *Exploring word processing software to identify features such as spell check, formatting options, and collaboration tools that support writing and editing digital texts.* • ***Digital Reading Skills***: *Using digital devices to explore different text features (e.g., hyperlinks, embedded videos) in online articles and eBooks, discussing how these enhance comprehension and engagement.* ***Mathematics***:	

- ***Math Tools***: *Identifying features of educational math apps and software (e.g., calculators, graphing tools) that facilitate problem-solving, calculations, and data visualization.*
- ***Interactive Games***: *Analyzing features of math games and simulations that engage students in practicing mathematical concepts and skills, such as levels, feedback mechanisms, and progress tracking.*
- ***Digital Manipulatives***: *Exploring interactive tools (e.g., virtual base-ten blocks, fraction bars) to understand how digital technologies represent and manipulate mathematical concepts.*

Science:

- ***Virtual Labs***: *Identifying features of virtual labs and simulations (e.g., controls for variables, data collection tools) that replicate real-world experiments and facilitate scientific inquiry.*
- ***Digital Resources***: *Exploring features of science websites and databases (e.g., search filters, multimedia content) that provide access to scientific information, images, and videos.*
- ***Interactive Models***: *Using digital tools to interact with 3D models and animations of scientific phenomena (e.g., cell structures, planetary orbits), understanding how digital technologies visualize complex concepts.*

Social Studies/ Civics:

- ***Geographical Tools***: *Identifying features of digital maps and geographic information systems (GIS) that display and analyze geographic data (e.g., layers, zoom controls, annotations).*
- ***Historical Archives***: *Exploring features of digital archives and museum collections (e.g., search functions, timelines, interactive exhibits) that preserve and present historical artifacts and information.*
- ***Civic Engagement Platforms***: *Analyzing features of websites and platforms (e.g., forums, voting tools) that promote civic participation and discussion on social and political issues.*

Digital Literacy/ Technology Education:

- ***Device Functions***: *Identifying and explaining features of digital devices (e.g., tablets, laptops) such as touchscreens, cameras, and connectivity options (e.g., Wi-Fi, Bluetooth).*
- ***Internet Safety Tools***: *Exploring features of internet safety software and parental controls (e.g., filters, monitoring tools) that protect against online risks and promote responsible digital citizenship.*

	• ***Coding Environments**: Analyzing features of coding platforms and software (e.g., block-based coding interfaces, syntax highlighting) that facilitate learning and creating programs.* ***Art**:* • ***Digital Art Tools**: Identifying features of digital art software (e.g., brushes, layers, blending modes) that allow artists to create and manipulate digital artworks.* • ***Graphic Design Features**: Exploring features of graphic design tools (e.g., templates, text effects, image filters) used to create digital posters, infographics, and multimedia presentations.* • ***Interactive Art Installations**: Analyzing features of interactive digital art installations (e.g., sensors, projection mapping) that engage viewers and respond to their actions or inputs.* ***Health Education**:* • ***Health Apps and Wearables**: Identifying features of health tracking apps and wearable devices (e.g., fitness trackers, sleep monitors) that monitor and promote personal health and wellness.* • ***Telemedicine Tools**: Exploring features of telemedicine platforms (e.g., video consultations, electronic health records) that enable remote healthcare services and patient-doctor communication.* • ***Digital Wellness Resources**: Analyzing features of mindfulness apps and digital wellness resources (e.g., meditation guides, stress management tools) that support mental well-being and digital balance.* ***Physical Education**:* • ***Fitness Technology**: Identifying features of fitness apps and devices (e.g., workout planners, heart rate monitors) that track physical activity, set fitness goals, and provide feedback.* • ***Virtual Fitness Classes**: Exploring features of online platforms and apps (e.g., live streaming, interactive workouts) that offer virtual fitness classes and personalized training sessions.* • ***Sports Analysis Tools**: Analyzing features of sports analysis software (e.g., video analysis, performance metrics) used to improve athletic techniques and strategies.*
Additional Examples and Resources	*Students create a venn diagram or other comparing chart to compare various forms of digital technology.* *When using different tools, compare them to others that might be similar (edpuzzle, nearpod, peardeck, etc.) or Google suite of apps.* *Students compare and contrast two different digital calculators.*

	Compare and contrast Google Docs vs. Microsoft Word

Digital Literacy: Digital Citizenship

<table>
<tr><td>Standard</td><td colspan="2">4-6.DL.6 Describe persistence of digital information and explain how actions in online spaces can have consequences.</td></tr>
<tr><td rowspan="2"></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td>persistence
digital information
actions
consequences</td><td>describe
explain</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">In order for students to be able to effectively manage their digital identities, it should be understood that online information doesn’t “go away,” and that information posted online can affect their real lives, even years in the future.</td></tr>
<tr><td>Focus Questions</td><td colspan="2">What is the persistence of digital information?
What does that mean for me?
What are the possible consequences to things that I share or do online?
How could your actions be “brought to light” after you do them with today's technological world?
What could happen if something you did is viewed in a negative light by a teacher, parent, prospective coach, college, or career?
What happens to a picture or post after it is deleted?
Can content I post still be viewed even after it is deleted?
Is posting a picture in a Snapchat story safe because it disappears?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Persistence
Digital information
Data retention
Storage
Data permanence

Online spaces
Digital footprint
Data trail
Privacy settings
Data privacy

Data security
Data deletion
Data archival
Data backup
Consequences</td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students use a tool that displays archived versions of websites (such as “Wayback Machine”) to research how information is available even if it seems to be deleted.
Example 2: Introduce students to “terms and conditions”/rules of websites. Example 3: Students could analyze school-used digital resources looking at student privacy and explain why each site is OK or not OK for school.</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Language Arts:

• Digital Citizenship: Discussing how online interactions and communications (e.g., emails, social media posts) can have lasting effects on relationships and reputations, emphasizing responsible digital behavior and etiquette.</td></tr>
</table>

Impacts of Computing | Computational Thinking | Networks and Systems Design | Cybersecurity | Digital Literacy

- ***Creative Writing***: *Exploring narrative writing prompts that highlight the impact of digital footprints and the consequences of online actions in storytelling, fostering empathy and understanding of diverse perspectives.*
- ***Media Literacy***: *Analyzing digital news articles and online content to understand how misinformation and digital footprints can influence public opinion and credibility of sources.*

Mathematics:

- ***Data Privacy***: *Learning about encryption and secure data practices to protect personal information online, understanding how digital information persistence relates to cybersecurity and privacy concerns.*
- ***Statistics***: *Analyzing data trends related to online behaviors and consequences (e.g., cyberbullying incidents, digital footprint statistics) to understand the quantitative impact of actions in digital spaces.*
- ***Problem-Solving***: *Using scenario-based math problems to explore real-life consequences of online actions, applying critical thinking skills to predict outcomes and make informed decisions.*

Science:

- ***Digital Forensics***: *Learning about digital forensics techniques used to trace and analyze digital footprints in cyber investigations, understanding the scientific methods behind tracking online actions and consequences.*
- ***Ethics in Technology***: *Discussing ethical considerations in data retention and privacy policies, exploring scientific research on data persistence and its implications for digital ethics and accountability.*
- ***Environmental Impact***: *Studying the environmental footprint of digital technologies and data storage, discussing sustainability issues related to digital information persistence and electronic waste management.*

Social Studies/ Civics:

- ***Legal Rights and Responsibilities***: *Exploring laws and regulations (e.g., COPPA, GDPR) that protect digital information and govern online behaviors, understanding how legal frameworks influence consequences for online actions.*
- ***Global Citizenship***: *Investigating global perspectives on digital information persistence and online accountability, discussing cultural differences in attitudes toward privacy and digital identity.*
- ***Digital Activism***: *Analyzing historical and contemporary examples of digital activism and social movements, exploring how online actions can drive social change and advocacy efforts.*

Digital Literacy/ Technology Education:

- ***Digital Footprint Analysis***: *Using digital footprint tools (e.g., Google activity dashboard, social media analytics) to analyze personal digital footprints and understand how online actions are recorded and archived.*
- ***Online Safety***: *Learning about strategies for safe and responsible online behavior, including managing digital identities, protecting against cyber threats, and navigating digital spaces with integrity.*
- ***Emerging Technologies***: *Exploring advancements in data storage, blockchain technology, and decentralized networks to discuss future implications for digital information persistence and cybersecurity.*

Art:

- ***Digital Art and Expression***: *Creating digital artworks or multimedia projects that explore themes of digital identity, privacy, and consequences of online actions, using visual storytelling to communicate ideas and perspectives.*
- ***Interactive Installations***: *Designing interactive digital art installations that simulate the concept of digital information persistence and its impact on viewers' interactions and engagement.*
- ***Visual Communication***: *Using graphic design tools to create infographics and posters that educate peers about the importance of managing digital footprints and understanding online consequences.*

Health Education:

- ***Digital Wellness***: *Exploring the mental and emotional impacts of online interactions and digital footprints on well-being, discussing strategies for maintaining a healthy balance between digital engagement and offline activities.*
- ***Behavioral Health***: *Learning about the psychological effects of cyberbullying and online harassment, discussing coping mechanisms and support resources for individuals affected by negative online experiences.*
- ***Digital Resilience***: *Promoting resilience and self-care strategies to navigate online challenges and manage digital reputations, fostering positive digital citizenship and ethical decision-making.*

Physical Education:

- ***Cyberfitness***: *Integrating physical fitness with digital wellness discussions, emphasizing the importance of balancing screen time with physical activity to maintain overall health and well-being.*

	• ***Sportsmanship and Online Conduct****: Discussing sportsmanship in online gaming and virtual competitions, exploring how digital interactions and behaviors reflect values of fairness, respect, and integrity.* • ***Digital Coaching****: Using online platforms and apps to track fitness progress and goals, discussing privacy settings and data security considerations when using fitness tracking devices and apps.*
Additional Examples and Resources	*Students create a list of inappropriate online activity and the potential consequences* *Students research an article about as student's online actions and the consequences* *Use real-life examples to explain how digital information doesn't just disappear and the consequences it can have in the future*

Digital Literacy: Digital Citizenship

<table>
<tr><td>Standard</td><td colspan="2">4-6.DL.7 Identify and describe actions in online spaces that could potentially be unsafe or harmful.</td></tr>
<tr><td rowspan="2"></td><td>Nouns</td><td>Verbs</td></tr>
<tr><td>actions
online space
unsafe
harmful</td><td>identify
describe</td></tr>
<tr><td>Clarifying Statement</td><td colspan="2">The focus is on identifying and describing potentially unsafe behaviors, and actions to take if they are witnessed or experienced, including cyberbullying. .</td></tr>
<tr><td>Focus Questions</td><td colspan="2">What are examples that could be considered bullying, harassment, or inappropriate?
What are some unsafe behaviors that I may witness or experience online?
What can I do about these things?
What behaviors should I report?
Who do I report unsafe behavior to?
How can I avoid unsafe activities online?</td></tr>
<tr><td>Academic Language</td><td colspan="2">Online safety
Cybersecurity
Online privacy
Cyberbullying
Online harassment
Phishing
Malware
Scams
Identity theft
Fraud
Password security
Social engineering
Unsafe websites
Inappropriate content
Online predators</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td>NYSED Examples</td><td colspan="2">Example 1: Students create PSAs on online safety and cyberbullying to include in district/school newsletters/newspaper or make posters to put up in the middle school.
Example 2: Students could write original songs about cyberbullying, identifying it when it happens and what to do when it occurs. (MUSIC)
Example 3: Students can create a classroom/school/home online safety plan. Discuss any differences and similarities.
Example 4: Students could identify how sharing personal information, clicking on pop-ups/ advertisements/ phish-bait, and allowing access to their camera could be unsafe.</td></tr>
<tr><td>Interdisciplinary Connections</td><td colspan="2">Language Arts:
• Digital Communication: Identifying unsafe or harmful behaviors in online messaging, emails, and social media interactions, discussing how cyberbullying, sharing personal information, and engaging in inappropriate conversations can have negative consequences.</td></tr>
</table>

- ***Writing Skills****: Writing persuasive essays or letters to fictional characters or peers about the importance of online safety, incorporating examples of unsafe behaviors and strategies for responsible digital communication.*
- ***Literature Analysis****: Reading age-appropriate literature or short stories that depict online safety issues (e.g., cyberbullying, online scams), analyzing characters' actions and consequences related to digital interactions.*

Mathematics*:*

- ***Data Privacy****: Learning about the importance of protecting personal information online, discussing unsafe practices such as sharing passwords, posting location details, and downloading suspicious files, and understanding the mathematical concepts behind encryption and secure data practices.*
- ***Statistics****: Analyzing statistics and graphs related to cyberbullying incidents, online scams, and internet safety trends, understanding how data can illustrate the prevalence and impact of unsafe online behaviors.*
- ***Problem-Solving****: Using scenario-based math problems to explore safe online practices, calculating risks and making informed decisions regarding internet safety and digital interactions.*

Science*:*

- ***Digital Footprint Analysis****: Using scientific inquiry skills to investigate the concept of digital footprints, understanding how online actions leave traces that can impact privacy and reputation, discussing ways to minimize digital footprints and protect personal information.*
- ***Cybersecurity****: Learning about cybersecurity threats and vulnerabilities, discussing common online risks such as phishing attacks, malware, and identity theft, and exploring scientific methods used to protect against digital threats.*
- ***Ethical Considerations****: Discussing ethical dilemmas related to digital information and online behaviors, exploring scientific research on digital ethics and the consequences of unsafe online actions.*

Social Studies/ Civics*:*

- ***Digital Citizenship****: Exploring the rights and responsibilities of digital citizens, discussing ethical guidelines for online behavior, and understanding how unsafe online actions (e.g., cyberbullying, spreading misinformation) can impact individuals and communities.*
- ***Internet Safety Laws****: Learning about laws and regulations related to internet safety and cybersecurity, discussing the role of government*

agencies and organizations in protecting online users from harm and promoting digital literacy.

- ***Global Perspectives**: Investigating global perspectives on internet safety and online behavior, discussing cultural differences in digital etiquette and legal frameworks that address unsafe online practices.*

***Digital Literacy/ Technology Education**:*

- ***Online Safety Tools**: Exploring digital tools and resources (e.g., parental controls, privacy settings, cybersecurity software) that promote online safety and protect against digital threats, understanding how technology can be used to enhance security and privacy.*
- ***Media Literacy**: Analyzing digital media and online content to identify unsafe practices (e.g., fake news, cyberbullying, online predators), discussing strategies for critically evaluating information and making informed decisions online.*
- ***Digital Resilience**: Learning about strategies for responding to cyberbullying and online harassment, discussing digital resilience and emotional well-being in the context of online interactions and peer relationships.*

***Art**:*

- ***Digital Art and Expression**: Creating visual artworks (e.g., posters, infographics) that raise awareness about online safety and promote responsible digital citizenship, using art to convey messages about the consequences of unsafe online behaviors.*
- ***Interactive Installations**: Designing interactive digital art installations that simulate online safety scenarios and encourage viewers to reflect on the impact of their digital actions, integrating artistic expression with discussions on digital ethics.*
- ***Visual Communication**: Using graphic design tools to create educational materials (e.g., comics, digital posters) that educate peers about safe online practices, emphasizing the importance of protecting personal information and respecting others online.*

***Health Education**:*

- ***Digital Wellness**: Exploring the relationship between online behaviors and mental health, discussing the impact of cyberbullying, social media comparison, and digital addiction on well-being, and learning strategies for maintaining a healthy balance in digital and offline activities.*
- ***Online Support Networks**: Learning about resources and support networks for individuals affected by online harassment and unsafe digital*

	interactions, discussing strategies for seeking help and promoting digital empathy. • ***Ethical Decision-Making**: Discussing ethical considerations in digital communication and social media use, exploring the role of empathy, respect, and responsible decision-making in fostering positive online interactions and relationships.* ***Physical Education**:* • ***Digital Fitness and Wellness**: Integrating discussions on online safety with physical fitness and wellness, exploring the importance of balancing screen time with physical activity to promote overall health and well-being.* • ***Sportsmanship and Online Conduct**: Discussing sportsmanship in online gaming and virtual competitions, exploring how digital interactions reflect values of fairness, respect, and integrity, and discussing strategies for promoting positive online behaviors among peers.* • ***Digital Coaching**: Using online platforms and apps to track fitness progress and goals, discussing privacy settings and data security considerations when using fitness tracking devices and apps.*
Additional Examples and Resources	*Students research and present about the privacy setting of different sites and platforms* *Students create checklists about those settings for others to follow* *Students considered examples of information posted online and determine if it is safe or not, and explain*