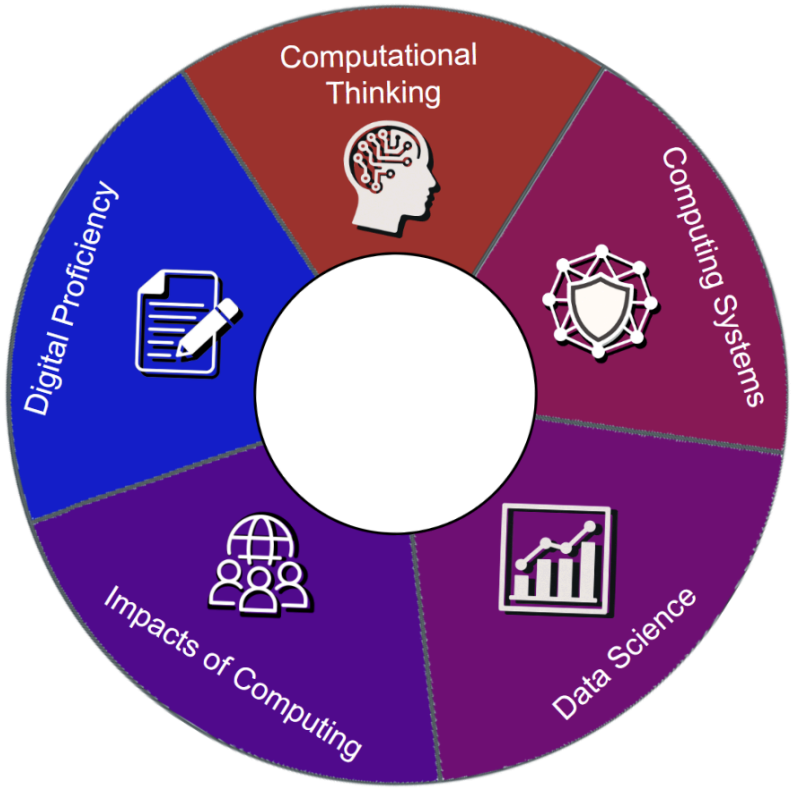
Alabama Course of Study:
Digital Literacy and Computer Science



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Alabama Course of Study:
Digital Literacy and Computer Science

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State Superintendent of Education

Alabama Course of Study: Digital Literacy and Computer Science
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OVERVIEW

Grade level standards in the 2025 *Alabama Course of Study: Digital Literacy and Computer Science* are organized into the following grade bands: Kindergarten-Grade 2; Grades 3-5; Grades 6-8; Grades 9-12. In the first three grade bands (covering Kindergarten through Grade 8), each grade level has its own specific standards. Standards for Grades 9 through 12 are universal for all four grade levels.

Each grade band section concludes with a glossary of terms introduced in that grade band which may be necessary for understanding the standards.

Within each grade level, the standards are organized into five conceptual themes. The conceptual themes are further subdivided into focus areas, which contain specific content standards. The chart below lists out the conceptual themes and their respective focus areas.

Computational Thinking	Data Science	Computing Systems	Impact of Computing	Digital Proficiency
● Algorithms, Abstraction, and Decomposition ● Programming	● Data Collection and Representation ● Data Analysis ● Modeling and Simulation	● Networks and Internet ● Cybersecurity ● Hardware ● Software	● Career Paths ● Ethics ● Society ● Emerging Technology ● Accessibility	● Information Literacy ● Digital Life ● Digital Tools

Standards related to the growing field and importance of Artificial Intelligence are noted with the code of [AI].

The 2025 *Alabama Course of Study: Digital Literacy and Computer Science* standards represent the minimum required content and are not intended to be the course curriculum. LEAs and local schools should use these standards to create a curriculum that utilizes available resources to meet the specific needs and interests of the local community.

KINDERGARTEN-GRADE 2 OVERVIEW

From Kindergarten to Grade 2, students gain foundational knowledge of how computers and digital tools help individuals think, solve problems, and connect with others. At this level, learning is hands-on and exploratory, and instruction focuses on helping students become confident users of technology and thinkers in a digital world.

Standards for Kindergarten through Grade 2 are designed to enable students to meet the following learning goals.

- **Computational Thinking:** Students learn to break problems into steps, recognize patterns, and use logical thinking to create simple plans or solutions.
- **Data Science:** Students explore how information can help them make decisions and solve problems in everyday situations.
- **Computing Systems:** Students identify types and functions of basic computing devices. They investigate how hardware and software work together, and practice using these devices responsibly and correctly.
- I**mpact of Computing:** Students describe how computers are used in many places, including homes, schools, hospitals, and more. They explain how technology helps people and also how they must be responsible, safe, and kind when using technology.
- **Digital Proficiency:** Students gain comfort and develop skills using age-appropriate digital tools to create, communicate, and explore. In doing so, they begin to become an integral part of society in a digital world.

K-2 standards are designed to enable students to develop the confidence to explore new tools, work with others on shared digital projects, and reflect on how technology supports learning, problem-solving, and creativity. They should begin to demonstrate perseverance, curiosity, and responsible digital behavior as they plan, construct, and analyze information using technology.

Conceptual Framework Theme:
Computational Thinking

Each content standard completes the stem, "Students will…"

FOCUS AREA: ALGORITHMS, ABSTRACTION, AND DECOMPOSITION		
Kindergarten	**Grade 1**	**Grade 2**
1. Create a plan that outlines the steps needed to complete a task, with guidance and support. 2. Classify essential information based on common characteristics, with guidance and support.	1. Create an algorithm to complete a task. 2. Identify a bug in a program. 3. Organize essential information into logical order, with or without digital tools.	1. Create an algorithm to solve a problem collaboratively and explain alternative ways to solve the same problem. 2. Test and debug a given program to make it work correctly. 3. Classify, evaluate, and represent essential information to solve a problem, using digital tools.

FOCUS AREA: PROGRAMMING		
Kindergarten	**Grade 1**	**Grade 2**
3. Construct elements of a simple program using unplugged activities, with guidance and support.	4. Construct elements of a simple computer program in collaboration with others, using unplugged and plugged activities.	4. Construct or modify a simple computer program, using basic commands.

Conceptual Framework Theme:
Data Science

Each content standard completes the stem, "Students will…"

FOCUS AREA: DATA COLLECTION AND REPRESENTATION		
Kindergarten	**Grade 1**	**Grade 2**
4. Collect and organize data in a logical way, with guidance and support. *Examples: chart, graph* 5. Sort objects into groups and label them to help a computer find patterns and make predictions. [AI]	5. Collect data and organize data into categories using a variety of tools, with guidance and support. 6. Create a simple chart with labels and features to help a computer sort items by recognizing patterns. [AI]	5. Collect, create, and logically organize data in a digital format. 6. Create a labeled dataset that includes features to help a computer classify items. [AI] *Examples: color, size, type*

Conceptual Framework Theme:
Computing Systems

Each content standard completes the stem, "Students will…"

FOCUS AREA: NETWORKS AND INTERNET		
Kindergarten	**Grade 1**	**Grade 2**
6. Explain what it means to be online.	7. Describe how devices connect and interact with other devices to perform specific functions.	7. Explain that information online comes from different computers (servers).

FOCUS AREA: CYBERSECURITY		
Kindergarten	**Grade 1**	**Grade 2**
7. Distinguish between private and public information and identify ways to keep personal information secure. 8. Identify ways to use online resources safely.	8. Demonstrate age-appropriate methods for keeping private information secure. 9. Demonstrate safe use of online resources, with guidance and support.	8. Explain the need for secure passwords and create one that meets simple criteria. 9. Use online resources safely in individual and collaborative settings.

FOCUS AREA: HARDWARE AND SOFTWARE		
Kindergarten	**Grade 1**	**Grade 2**
9. Identify the function of basic hardware components of a digital device, including input and output devices. *Examples: mouse, keyboard,*	10. Locate and identify sensors on electronic devices. *Examples: camera, microphone*	10. Use basic software features within familiar applications. *Examples: save, open, share, print*

touchscreen, screen, speaker, printer	11. Describe and attempt troubleshooting steps to solve a technology problem, with guidance and support.	11. Describe and attempt troubleshooting steps to solve a technology problem.

Conceptual Framework Theme:
Impact of Computing

Each content standard completes the stem, "Students will…"

FOCUS AREA: SOCIETY		
Kindergarten	**Grade 1**	**Grade 2**
		12. Explain how technology impacts the way people live and work.

FOCUS AREA: EMERGING TECHNOLOGY		
Kindergarten	**Grade 1**	**Grade 2**
10. Identify devices in daily life that use emerging technologies. [AI] 11. Compare intelligent and non-intelligent machines, and discuss what makes a machine intelligent. [AI] *Examples: self-driving car vs. pencil sharpener; robot vacuum vs. toaster*	12. Describe the types of tasks emerging technology can and cannot perform, and explain how it supports daily activities at home, at school, and in the community. [AI]	13. Explain that AI uses data to find patterns but can make a mistake if the data is biased or incorrect. [AI]

FOCUS AREA: ACCESSIBILITY		
Kindergarten	**Grade 1**	**Grade 2**

Conceptual Framework Theme:
Digital Proficiency

Each content standard completes the stem, "Students will…"

FOCUS AREA: INFORMATION LITERACY		
Kindergarten	**Grade 1**	**Grade 2**
12. Use age-appropriate sources to find answers to simple questions, with guidance and support.	13. Identify keywords from a question or topic and use age-appropriate digital resources to conduct research, with guidance and support.	14. Perform a simple keyword search within a search engine or website.

FOCUS AREA: DIGITAL LIFE		
Kindergarten	**Grade 1**	**Grade 2**
13. Identify ways people communicate using technology.	14. Differentiate between appropriate and inappropriate behaviors for communicating in a digital environment.	15. Explain how sharing information online contributes to a user's digital footprint.

FOCUS AREA: DIGITAL TOOLS		
Kindergarten	**Grade 1**	**Grade 2**
14. Use basic input and output devices to interact with digital platforms, with guidance and support.	15. Independently use basic input and output devices to interact with digital platforms.	16. Explain the purposes of input and output components of digital devices.

15. Identify an appropriate digital tool to complete a given task, with guidance and support.	16. Use online digital tools to create a collaborative product, with guidance and support. 17. Locate letters and numbers on the keyboard.	17. Identify and use multiple digital tools to complete a project, with guidance and support. 18. Type five words per minute, using efficient keyboarding techniques.

KINDERGARTEN-GRADE 2
Glossary

Abstraction: The process of removing unnecessary details to focus on key information when solving problems or designing programs.
Algorithm: A sequence of steps or instructions used to solve a problem or perform a task.
Artificial Intelligence (AI): A computer program that can learn or make decisions like a person.
Assistive technology: Special tools that help people with disabilities use computers.
Bug: A mistake in a computer program that makes it not work correctly.
Code/Coding: Writing instructions (code) that a computer can follow.
Computational thinking: A way of solving problems using steps, patterns, and logic like a computer would.
Cybersecurity: The practice of protecting computers, networks, and data from digital attacks or unauthorized access.
Dataset: A collection of information that computers use to learn, analyze, or make decisions
Debugging: Finding and fixing problems in a program.
Decomposition: Breaking a complex problem into smaller, more manageable parts to solve it effectively.
Digital footprint: The record left behind by a person's digital activities, including websites visited and content shared.
Hardware: The physical parts of a computer, such as the screen, keyboard, or mouse.
Information literacy: Knowing how to find and check information online.
Input device: A part of a computer that helps the user give it information, such as a keyboard or camera.
Network: A group of computers that can talk to each other.
Output device: A part of a computer that gives information back to the user, such as a screen or speaker.
Program: A set of instructions that tells a computer what to do.
Programming: Giving a computer step-by-step instructions to do a task.
Sensor: A device part that collects information, such as sound, light, or movement.
Software: The programs or applications that tell the computer what to do.
Troubleshooting: Solving problems when something on the computer doesn't work.
Unplugged activities: Hands-on activities that teach computer science concepts without using electronic devices, such as puzzles, games, or other interactive tasks.

GRADES 3-5 OVERVIEW

From Grade 3 to Grade 5, students build on their early digital experiences by engaging with a range of computing systems and digital tools. At this stage, they strengthen their problem-solving abilities and begin to think computationally, approaching challenges in both logical and creative ways. Their growing confidence and increasing academic ability allow them to design, innovate, and collaborate more independently, applying skills learned in earlier grades to new and more complex tasks.

Standards for Grades 3 through 5 are designed to enable students to meet the following learning goals:

- **Computational Thinking:** Students apply structured problem-solving strategies to write and debug algorithms. They evaluate and create representations of information that help reframe and clarify real-world challenges.
- **Data Science:** Students begin to collect, organize, and interpret data as they develop the ability to draw conclusions and make informed decisions based on their analysis.
- **Computing Systems:** Students develop deeper insights into how devices and software interact. They learn to use a variety of computing tools strategically to solve problems and complete tasks efficiently.
- **Impact of Computing:** Students demonstrate awareness of how technology shapes behavior, communication, and society. They reflect on ethical use, digital security, and the responsibilities that come with being part of a digital world.
- **Digital Proficiency:** Students use research and communication tools effectively as they collaborate with others to create digital artifacts and responsibly exchange information in digital spaces.

When students engage with these learning standards in environments that encourage curiosity, collaboration, and creativity, they move closer to becoming an integral part of society in a digital world. They become equipped to analyze problems, apply design thinking, and develop innovative solutions that make a positive impact locally and globally. Through this process, they apply logic, intuition, imagination, and systematic reasoning to explore possibilities and bring meaningful ideas to fruition.

Conceptual Framework Theme:
Computational Thinking

Each content standard completes the stem, "Students will…"

FOCUS AREA: ALGORITHMS, ABSTRACTION, AND DECOMPOSITION		
Grade 3	**Grade 4**	**Grade 5**
1. Develop and document an algorithm that outlines specific steps to complete a project for other learners to follow. 2. Use numbers or letters to represent information in another form. 3. Demonstrate how a larger problem can be broken into sub-problems. 4. Describe the function of a flowchart.	1. Build and revise an algorithm and defend the choices made during the process. 2. Construct a system of numbers, letters, or symbols to represent information. 3. Analyze given sub-problems while addressing a larger problem. 4. Use flowcharts to create a plan or algorithm. 5. Define a simple pseudocode.	1. Compare two or more algorithms and discuss each one's advantages and disadvantages for a specific task. 2. Create and use a system of representative letters, numbers, or symbols, including binary code, to identify patterns in related data. 3. Create a simple pseudocode.

FOCUS AREA: PROGRAMMING		
Grade 3	**Grade 4**	**Grade 5**
5. Create a working program using sequencing and events in a block-based visual programming environment, working in collaboration with others.	6. Create a working program using conditionals and loops in a block-based visual programming environment, working in collaboration with others.	4. Create a working program using variables in a block-based visual programming environment, independently or collaboratively.

Computer Science Theme:
Data Science

Each content standard completes the stem, "Students will…"

FOCUS AREA: DATA COLLECTION AND REPRESENTATION		
Grade 3	**Grade 4**	**Grade 5**
6. Organize data to answer a question, using a variety of computing and data visualization methods.	7. Collect and organize data to answer a question, using a variety of computing and data visualization methods. 8. Describe how AI systems use data to make predictions or decisions. [AI]	5. Create clear and accurate data visualizations using digital tools, including labels and titles, to communicate findings to an audience. 6. Evaluate how AI uses data to represent the world and make predictions or decisions. [AI] *Examples: recognizing a cat based on labeled cat images*

Conceptual Framework Theme:
Computing Systems

Each content standard completes the stem, "Students will…"

FOCUS AREA: NETWORKS AND INTERNET		
Grade 3	**Grade 4**	**Grade 5**
7. Explain what makes the Internet a global network.	9. Explain how cloud computing allows users to access files and programs over the Internet. 10. Identify the parts of a URL.	7. Explain how devices connect and communicate in a simple network.

FOCUS AREA: CYBERSECURITY		
Grade 3	**Grade 4**	**Grade 5**
8. Apply strategies to create and manage passwords. 9. Identify examples of unusual activity of applications and devices that should be reported.	11. Describe suspicious online activities *Examples: phishing, malware, privacy settings* 12. Discuss possible strategies to protect one's self from malicious online activity.	8. Research and discuss the purposes and potential privacy implications of online tracking methods. 9. Discuss possible defenses against forms of online manipulation and impersonation. *Examples: phishing, baiting*

FOCUS AREA: HARDWARE AND SOFTWARE		
Grade 3	**Grade 4**	**Grade 5**
10. Explain the purpose and importance of regular software updates and patches.	13. Describe the differences between hardware and software.	10. Describe how hardware and software work together as a system to accomplish tasks.

Conceptual Framework Theme:
Impact of Computing

Each content standard completes the stem, "Students will…"

FOCUS AREA: ETHICS		
Grade 3	**Grade 4**	**Grade 5**
	14. Explain the potential consequences of cyberbullying and identify strategies for prevention and response.	11. Analyze scenarios involving online ethical dilemmas and propose responsible actions based on ethical principles and the school or district's acceptable use policy. *Examples: cyberbullying, plagiarism, privacy violations* 12. Describe how an AI system satisfies the design goals of being transparent and understandable to users. [AI]

FOCUS AREA: SOCIETY		
Grade 3	**Grade 4**	**Grade 5**
11. Identify technological inventions and contributions that have impacted society.	15. Explain how technology has changed the ways people communicate and interact and describe the positive and negative effects of these changes.	13. Explain how a specific technology can be used to raise awareness, help others, or solve a problem in society. [AI] *Examples: social media, AI tools, online games*

FOCUS AREA: EMERGING TECHNOLOGY		
Grade 3	**Grade 4**	**Grade 5**
12. Compare and contrast virtual environments with real-world settings.	16. Write a prompt to guide AI tools in generating useful responses, and explain how different prompts affect the results [AI] 17. Explore and describe how emerging technologies can be used for learning and daily life.	14. Collaborate on projects that use digital tools for creative problem-solving by applying appropriate prompting strategies. [AI] 15. Analyze and discuss the benefits and challenges of using emerging technologies in education, work, and daily life.

FOCUS AREA: ACCESSIBILITY		
Grade 3	**Grade 4**	**Grade 5**
13. Explain how technology can be designed to support people with different needs, and identify tools that make technology more accessible for everyone. *Examples: text-to-speech, captions, screen reader*	18. Explain how designing for accessibility (Universal Design Principles) can benefit all users.	16. Identify basic accessibility features in websites and digital tools and explain how they support users with different needs.

Conceptual Framework Theme:
Digital Proficiency

Each content standard completes the stem, "Students will…"

FOCUS AREA: INFORMATION LITERACY		
Grade 3	**Grade 4**	**Grade 5**
14. Use keywords in a search engine to find information relevant to a specific question.	19. Utilize search strategies to find accurate and relevant online information. *Examples: Boolean operators, synonyms, search filters* 20. Evaluate the credibility of an online source based on criteria.	17. Develop search queries and refine them based on results. 18. Compare and evaluate multiple sources of online information to determine whether the information is factual. *Example: Deep Fake [AI]* 19. Differentiate between quoting, paraphrasing, and plagiarizing, and demonstrate responsible use of information from other sources.

FOCUS AREA: DIGITAL LIFE		
Grade 3	**Grade 4**	**Grade 5**
15. Describe ways digital platforms collect personal information. 16. Demonstrate appropriate behaviors that reflect a positive and responsible digital footprint when communicating in a digital environment.	21. Explain why digital platforms may include advertisements and collect personal information. 22. Create and share digital content that reflects respectful communication to demonstrate responsible online interactions.	20. Describe how communicating and sharing information online can affect individuals, families, and communities in both positive and negative ways. 21. Discuss the long-term implications of online actions for reputation and safety.

	23. Describe the user's responsibilities for digital footprints, both their own and those of others.	22. Distinguish between human learning and computer learning. [AI] *Example: Human learning involves emotion, reasoning, and decision-making, while computer learning relies on data input, training, and machine learning models to recognize patterns or predict outcomes.*

FOCUS AREA: DIGITAL TOOLS		
Grade 3	**Grade 4**	**Grade 5**
17. Select and use multiple digital tools to complete a project. 18. Type 10 words per minute using efficient keyboarding techniques.	24. Use digital tools to create images, audio or videos to complete assignments or share ideas. 25. Explain the ways users save information in an organized manner on digital devices. *Examples: name files, set up folders, use cloud-based storage, arrange files chronologically* 26. Type 15 words per minute using efficient keyboarding techniques.	23. Use digital tools to work with peers, provide feedback, and manage shared projects. 24. Organize and manage files and folders, using file system navigation and naming conventions. 25. Type 20 words per minute using efficient keyboarding techniques.

GRADES 3-5
Glossary

Block-based programming language: A programming language that allows users to create programs by arranging "blocks" or graphical elements, instead of writing text-based codes.
Cloud Computing: The delivery of computing services—such as storage, software, and processing power—over the Internet, allowing users to access files and programs from any device with an Internet connection."
Conditionals: Statements in a program that run *only if* certain conditions are met. They help computers make decisions by checking if something is *true* or *false* before choosing what to do next.
Flowchart: A diagram that shows the steps of a process or algorithm using symbols and arrows to represent decisions, actions, and the flow of information.
Immersive technology: Tools and systems that blend the physical and digital worlds to create environments where users feel deeply engaged.
Loop: A set of instructions that runs over and over until it is told to stop.
Pseudocode: A method for designing algorithms using structured but human-readable language.
Simulation: A computer-based model that mimics real-world processes or systems, allowing students to explore and test scenarios in a virtual environment.
Universal Design Principles: A framework of seven principles focused on creating environments, products, and systems that are usable by all people, to the greatest extent possible, without the need for specialized design or adaptation.
Variable: A symbol or name, such as a number or word, that holds a value which can change during a program.

GRADES 6-8 OVERVIEW

In Grades 6, 7, and 8, students develop greater independence as they integrate themselves into the increasingly digital and global society around them. Many of these students will begin constructing their global online presence for the first time. In these grades, students are becoming proficient digital citizens, while continuing to build on a strong foundation in computer science principles. The goals of the content strands at this level demonstrate this balance.

Standards are designed to enable students in sixth, seventh, and eighth grades to address the following learning goals.

- **Computational Thinking:** Students strengthen their problem-solving skills using decomposition, abstraction, and debugging. They modify, write, and improve their own algorithms using pseudocode, flowcharts, and programming languages.
- **Data Science:** Students utilize effective and appropriate means to collect, organize, and analyze data. They connect what they learn about data and its patterns to make informed decisions and gain a deeper understanding of AI. Through modeling and simulation, students test how inputs affect outcomes and modify models.
- **Computing Systems:** Students deepen their understanding of how networks operate, including how devices communicate, as well as how software and hardware work together. They explore cybersecurity by identifying threats, practicing safe online behavior, and developing strategies to protect data and devices.
- **Impact of Computing:** Students analyze how technology affects and shapes society, including careers, culture, and communication. They learn to evaluate emerging technologies and understand the legal and ethical responsibilities involved in using them..
- **Digital Proficiency:** Students evaluate digital content for credibility and cite sources to give their credibility to their own work. Students reflect on their own digital lives to understand how technology affects their wellbeing.

Through engagement with the content standards for Grades 6 through 8, students apply analysis, synthesis, and evaluation in digital literacy and computer science in conjunction with other areas of academic studies. Students in these grades work collaboratively to explore, employ, and develop digital tools, demonstrating skills needed for success in a digital world.

Conceptual Framework Theme:
Computational Thinking

Each content standard completes the stem, "Students will…"

FOCUS AREA: ALGORITHMS, ABSTRACTION, AND DECOMPOSITION		
Grade 6	**Grade 7**	**Grade 8**
1. Create pseudocode using sequencing, selection, and iteration. 2. Differentiate between flowcharts and pseudocode and create both to solve a task. 3. Trace and debug pseudocode to identify outcomes and correct logical errors. 4. Break a task into smaller steps and evaluate the purpose and effectiveness of each step to solve a problem . 5. Explain how abstraction simplifies tasks, using real-life examples.	1. Design and test algorithms using pseudocode with sequencing, selection, and iteration. 2. Create a flowchart and corresponding pseudocode to plan and explain a process. 3. Debug algorithms with selection and iteration and explain improvements. 4. Analyze a complex problem by dividing it into logical parts that can be completed collaboratively. 5. Create functions to reduce complexity in programming.	1. Utilize a programming language to create algorithms that include sequencing, selection, and iteration. 2. Design multi-branched flowcharts and corresponding pseudocode. 3. Evaluate and debug programs with nested logic. 4. Decompose a program into multiple parts, supporting maintainability. 5. Create reusable functions to simplify repeated code and explain how abstraction improves clarity.

FOCUS AREA: PROGRAMMING		
Grade 6	**Grade 7**	**Grade 8**
6. Create a program that makes decisions based on conditions. 7. Create an interactive program.	6. Design and implement a program that solves a problem using sequencing,	6. Implement an existing program by adding new features or improving its efficiency.

	conditionals, and user input to control the program's behavior.	7. Explain how software is developed, tested, and maintained to ensure quality.

Conceptual Framework Theme:
Data Science

Each content standard completes the stem, "Students will…"

FOCUS AREA: DATA COLLECTION AND REPRESENTATION		
Grade 6	**Grade 7**	**Grade 8**
8. Differentiate between numeric and text data types and construct simple data structures. *Examples: lists, tables, charts, graphs* 9. Explain why computers use a binary system.	7. Write a program that utilizes multiple data types and structures. 8. Convert simple text and numbers into binary manually or using digital tools.	8. Design a data store and apply validation techniques. *Examples: forms, spreadsheets, databases* 9. Explain how binary data is used in computing systems to represent and process different types of information. 10. Explain how data size and format affect storage and performance.

FOCUS AREA: DATA ANALYSIS		
Grade 6	**Grade 7**	**Grade 8**
10. Create graphs or charts from simple datasets to identify patterns and describe key findings. 11. Generate and interpret descriptive statistics, including mean, median, and mode, to summarize data.	9. Apply basic data analysis techniques to draw conclusions from structured datasets. *Examples: charts, graphs, statistical measures (mean, median, and mode)*	11. Use digital tools to analyze large or real-world datasets, detect anomalies, and develop narratives based on findings. 12. Explain how AI systems use data to make decisions and predictions. [AI]

	10. Use evidence from multiple data sources to support claims or decisions related to real-world problems.	

FOCUS AREA: MODELING AND SIMULATION		
Grade 6	**Grade 7**	**Grade 8**
12. Use basic models or simulations to test how changes in input affect outcomes.	11. Modify a model or simulation to improve its accuracy and describe how changes in input affect the results.	13. Develop a model or simulation and evaluate its accuracy and limitations.

Conceptual Framework Theme:
Computing Systems

Each content standard completes the stem, "Students will…"

FOCUS AREA: NETWORKS AND INTERNET		
Grade 6	**Grade 7**	**Grade 8**
13. Explain the basic roles of routers, IP addresses, domain names, and servers in network communication.	12. Compare different types of networks including LAN, WAN, and wireless. 13. Differentiate between the Internet and the World Wide Web, and describe how data travels between devices using basic protocols. *Examples: IP, HTTP* 14. Identify Internet of Things (IoT) devices and explain how they communicate with other devices over a network.	14. Create a diagram of a network to meet specific needs, including modems, routers, and servers. 15. Explain how data is broken into packets, sent across the Internet, and reassembled, including how multiple protocols work together for communication. 16. Explain how cloud computing enables data access. 16a. Outline the advantages and limitations of technologies that enable data access. *Examples: cloud storage, IoT*

FOCUS AREA: CYBERSECURITY		
Grade 6	**Grade 7**	**Grade 8**
14. Identify common online threats, including social engineering, and describe safe practices to protect personal information. *Examples: phishing, scams*	15. Explain how sensitive data can be compromised by threats and analyze how strong security practices can reduce these risks.	17. Dissect an actual cybersecurity breach, identify failure points, and explain how better safeguards could have prevented the attack.

15. Explain how strong passwords and multi-factor authentication help protect data. 16. Compare safe and unsafe online behaviors related to social media use, personally identifiable information, and cyberbullying.	*Examples: viruses, malware, cyberattacks* 16. Outline cybersecurity practices, including firewalls, antivirus software, and secure passwords, and explain how to identify and reduce system vulnerabilities. 17. Demonstrate strategies for protecting personal information and digital identity.	18. Evaluate cybersecurity risks across networks, applications, and cloud-based systems and recommend improvements. 19. Create a personal cybersecurity plan which includes identifying online risks, evaluating their own digital footprint, adjusting privacy settings, and describing steps to protect their accounts and personal information.

FOCUS AREA: HARDWARE AND SOFTWARE		
Grade 6	**Grade 7**	**Grade 8**
17. Perform basic troubleshooting to solve hardware problems. 18. Identify examples of system and application software, and match common applications to appropriate tasks. *Examples: word processing, photo editing, coding* 19. Explain the purpose of an operating system and how it manages hardware and software resources.	18. Evaluate the benefits and limitations of hardware components for different users and computing needs. *Examples: processor, memory, storage, input and output devices* 19. Analyze how different operating systems work for various types of devices.	20. Demonstrate how hardware components work together in the data processing cycle to perform computing tasks. *Examples: processor, memory, storage, input and output devices* 21. Evaluate the advantages and disadvantages of open-source as compared to proprietary software in different scenarios.

Conceptual Framework Theme:
Impact of Computing

Each content standard completes the stem, "Students will…"

FOCUS AREA: CAREER PATHS		
Grade 6	**Grade 7**	**Grade 8**
20. Identify a variety of careers related to computer science.	20. Investigate various careers in computer science and related fields, and identify the skills commonly required for those roles.	22. Research and report on the responsibilities of various computer science careers.

FOCUS AREA: ETHICS		
Grade 6	**Grade 7**	**Grade 8**
21. Summarize state and federal laws related to technology use, including those regulating copyright and intellectual property. 22. Describe how AI systems function in everyday life and examine the ethical considerations they raise. [AI] *Examples: decision-making, privacy, bias*	21. Explain the importance of intellectual property, copyright, and fair use in digital media. 22. Analyze ethical dilemmas involving the use of technology, including AI bias and misuse. [AI]	23. Demonstrate safe, legal, and ethical habits when creating and sharing digital content. 24. Evaluate ethical dimensions and societal impacts of AI technologies. [AI]

FOCUS AREA: SOCIETY		
Grade 6	**Grade 7**	**Grade 8**
23. Explain how computing technologies have changed and will continue to change the way people communicate, learn, and work in their daily lives and communities.	23. Describe ways computing technologies can transform culture, economy and society.	25. Analyze how computing technologies have impacted laws and social structures over time.

FOCUS AREA: EMERGING TECHNOLOGY		
Grade 6	**Grade 7**	**Grade 8**
24. Identify examples of emerging technologies and describe their purposes.	24. Assess the usefulness of emerging technologies. [AI] *Examples: Artificial Intelligence, quantum computing*	26. Analyze the use of emerging technologies in everyday life, and outline their benefits and limitations. [AI] *Examples: AI, smart devices*

FOCUS AREA: ACCESSIBILITY		
Grade 6	**Grade 7**	**Grade 8**
25. Evaluate accessibility features in digital tools and explain how they improve usability for individuals with diverse abilities.	25. Apply basic accessibility principles when creating digital content. *Examples: using clear headings, providing simple alternative text for images*	27. Design and implement solutions that address specific accessibility needs. 28. Research and report on technology expectations for accessibility from the American with Disabilities Act (ADA).

Conceptual Framework Theme:
Digital Proficiency

Each content standard completes the stem, "Students will…"

FOCUS AREA: INFORMATION LITERACY		
Grade 6	**Grade 7**	**Grade 8**
26. Analyze digital content for reliability and cite sources properly.	26. Apply strategies for verifying information, cross-referencing sources and using digital tools to assess credibility and accuracy.	29. Synthesize information from credible sources to create an original product. 30. Explain how media manipulation influences perception and public opinion.

FOCUS AREA: DIGITAL LIFE		
Grade 6	**Grade 7**	**Grade 8**
27. Investigate their own digital footprints to describe the effects digital footprints can have on them and others.	27. Analyze their own technology use and explain the impact of online activities on their lives and well-being.	31. Develop strategies to manage screen time, handle multitasking, and balance the use of technology in daily life.

FOCUS AREA: DIGITAL TOOLS		
Grade 6	**Grade 7**	**Grade 8**
28. Demonstrate how to save and organize digital content using appropriate file system structure.	28. Select and apply appropriate online tools and file types for different tasks. 29. Collaborate with peers using online platforms to co-author and revise	32. Evaluate the effectiveness of digital tools for communication and project-based collaboration. 32a. Compose professional emails and presentations, demonstrating clear

29. Identify AI and non-AI technologies and features when using digital tools. [AI] 30. Input text at a rate of 25 words per minute, via keyboard or alternative text input method.	multimedia content, adjusting tone and format for audience and purpose. 30. Compare and contrast AI-generated artifacts with human-generated artifacts. [AI] 31. Input text at a rate of 30 words per minute, via keyboard or alternative text input method.	purpose, tone, and etiquette across digital platforms. 33. Produce original content through guided collaboration with AI systems. [AI] 34. Input text at a rate of 35 words per minute, via keyboard or alternative text input method.

GRADES 6-8
Glossary

Binary: A base-2 number system used to represent data in computing using only 0s and 1s.
Concatenation: A process of combining two or more strings into a single larger string.
Conditional Statements: Programming constructs that allow a program to execute different blocks of code based on whether a certain condition is true or false.
Data store: A repository that stores, manages, and safeguards information in a computer system.
Data types: The classification of data based on its format or nature, such as integers, strings, booleans, and floats.
Debugging: The process of identifying and correcting errors or bugs in a program.
Ethical behavior: Acting in ways that are responsible, respectful, and legally appropriate when using technology.
Flowchart: A diagram that represents an algorithm, showing the steps using symbols and arrows.
Iteration: Repeating a set of instructions in a loop until a condition is met.
LAN (local area network): A group of interconnected computing devices with a small, localized area, like a home, office, or building.
Maintainability: The ease with which a software system can be understood, modified, and improved over time.
Malware: Software that is intentionally designed to cause damage to a computer or network.
Model: A simplified representation used to simulate, test, or understand a system or process.
Multi-factor authentication: A security enhancement that requires users to provide multiple verification steps, usually two or more, when logging in to a system or an account.
Operating system: Software that manages hardware resources and provides services for computer programs.
Phishing: A cyberattack method that uses deceptive messages to trick users into sharing sensitive information.
Protocol: A set of rules governing how data is transmitted across a network.
Scalability: A system's ability to grow and handle increased demand effectively.
Social engineering: Tricks used to manipulate people into sharing private information, like passwords or personal details, often by pretending to be someone trustworthy.
System vulnerability: A weakness in a computer system that can be exploited to cause harm.
WAN (wide area network): A network that connects large geographic areas, often spanning cities, countries, or even the globe.

GRADES 9-12 OVERVIEW

In Grades 9 through 12, students undergo significant personal and academic growth as they prepare for post-secondary education and future careers. They refine their skills, make important decisions about their paths, and take greater ownership of their learning. As they face more complex academic challenges and learn to balance independence with collaboration, high school students develop essential skills in problem-solving, leadership, and communication. Through both academic and extracurricular experiences, they gain a deeper understanding of their roles in local and global communities while exploring potential career paths, college options, and civic responsibilities.

With access to a global network of perspectives, students engage with peers from different backgrounds and cultures through technology. As digital platforms continue to transform how people work, learn, and communicate, navigating this interconnected world becomes increasingly essential. The demand for skills in digital literacy, computer science, and cross-cultural collaboration will continue to grow in the coming years. The development of these skills equip students to thrive in a rapidly changing global economy, empowering them to solve complex challenges, innovate across fields, and engage as responsible digital citizens.

Standards are designed to enable high school students to address the following learning goals:

- **Computational Thinking**: Students dissect complex problems, design algorithmic solutions, and apply programming concepts to simulate and solve real-world challenges.
- **Data Science:** Students collect, organize, and interpret data using appropriate tools to generate meaningful insights and make informed decisions.
- **Computing Systems:** Students analyze how hardware, software, and networks work together, evaluate system performance, and troubleshoot issues in modern digital environments.
- **Impact of Computing:** Students examine the ethical, legal, and societal implications of computing technologies and explore how these innovations shape access, fairness, and global interaction.
- **Digital Proficiency:** Students demonstrate responsible, adaptive, and secure use of digital tools to communicate, collaborate, and create effectively in dynamic digital contexts.

When these learning standards are mastered in a student-centered environment, students gain a deeper understanding of technology's role in shaping the modern world. They develop critical skills in computational thinking, computing systems, data science, and digital proficiency, while analyzing the societal impact of computing. These skills empower students to thrive in a digital, interconnected future, preparing them for success in both higher education and the workforce.

Conceptual Framework Theme:
Computational Thinking

Each content standard completes the stem, "Students will…"

Grades 9-12	
FOCUS AREA: ALGORITHMS, ABSTRACTION, AND DECOMPOSITION	1. Differentiate between a generalized expression of an algorithm in pseudocode and its concrete implementation in a programming language.
	2. Translate pseudocode into multiple programming languages.
	3. Explain the characteristics of algorithms, including speed, accuracy, and storage requirements.
	4. Model and adapt classic algorithms, including sorting and searching, to solve computational problems.
	5. Decompose problems into component parts, extract key information, and model levels of abstraction in complex systems.
	6. Compare the characteristics of various compression algorithms, including speed and lossless and lossy algorithms.
	7. Create software solutions using libraries and application programming interfaces that demonstrate code reuse.
FOCUS AREA: PROGRAMMING	8. Compare and contrast fundamental data structures and their uses. *Examples: strings, lists, arrays, stacks, queues*
	9. Develop and use a series of test cases to verify that a program performs according to its design specifications.
	10. Utilize an iterative software design process, including learning from mistakes, to improve a program.
	11. Refactor existing code to make it more readable and efficient.
	12. Select and utilize effective debugging techniques to correct problems in software.
	13. Create a complete program to solve a problem or explore personal interests, using a text-based programming language.

	14. Implement a rules-based algorithm that interactively responds to a user's input. *Examples: AI response generator, tic-tac-toe*

Conceptual Framework Theme:
Data Science

Each content standard completes the stem, "Students will…"

Grades 9-12	
FOCUS AREA: DATA COLLECTION AND REPRESENTATION	15. Create interactive data visualizations to help others understand real-world phenomena.
	16. Verify the validity of a dataset. 16a. Identify erroneous data in a given dataset, including out-of-range, missing, or invalid entries. 16b. Differentiate erroneous data from statistical outliers in a given dataset.
FOCUS AREA: DATA ANALYSIS	17. Utilize data analysis tools and techniques to identify patterns in data representing complex systems.
FOCUS AREA: MODELING AND SIMULATION	18. Create and utilize models and simulations to help formulate, test, and refine a hypothesis.
	19. Update an existing model to address flaws and improve precision.
	20. Compare and contrast the major categories of machine learning, including supervised, unsupervised, and reinforcement learning. [AI]

Conceptual Framework Theme:
Computing Systems

Each content standard completes the stem, "Students will…"

Grades 9-12	
FOCUS AREA: NETWORKS AND INTERNET	21. Analyze how network infrastructure impacts the speed, reliability, and scalability of services.
	22. Explain how security protocols in networked systems protect or expose data and assess the risks associated with IoT devices and cloud services.
FOCUS AREA: CYBERSECURITY	23. Explain the tradeoffs when selecting and implementing cybersecurity recommendations, including cost, performance, and user experience. *Examples: two-factor authentication, password requirements, geolocation requirements*
	24. Summarize the mechanisms and purposes of various tracking technologies and identify strategies to manage them.
	25. Investigate the purpose of and relationship between various computer security measures. *Examples: firewalls, authentication, encryption*
	26. Create a personal cybersecurity plan incorporating the CIA Triad (*confidentiality, integrity, and availability*) to safeguard sensitive information and ensure its trustworthiness and accessibility.
	27. Research the motivation and ethics regarding hacking.
	28. Appraise the trustworthiness of new or unfamiliar resources in order to make safe choices when downloading, installing, and using software.
FOCUS AREA: HARDWARE AND SOFTWARE	29. Compare alternative computing architectures, including cluster and quantum computing, to classical computing systems.
	30. Explain the interactions between application software, operating systems, drivers, and hardware.
	31. Compare and contrast the common metadata elements of various file types.

	32. Develop and implement troubleshooting strategies to identify and fix problems with computing devices.

Conceptual Framework Theme:
Impact of Computing

Each content standard completes the stem, "Students will…"

Grades 9-12	
FOCUS AREA: CAREER PATHS	33. Research and explain the impact of computing technology on career pathways across different industries and career fields.
	34. Research and share information regarding real-world AI applications in various career fields. [AI] *Examples: healthcare, transportation, entertainment*
FOCUS AREA: ETHICS	35. Analyze the implications of data privacy and consent in making informed decisions about personal data security.
	36. Identify consequences and implications of laws regarding the use of technology. *Examples: intellectual property, privacy, accessibility*
FOCUS AREA: SOCIETY	37. Analyze the ethical issues related to AI technologies and evaluate their impact on society and the environment. [AI]
FOCUS AREA: EMERGING TECHNOLOGY	38. Predict the transformative effects of hypothetical future technologies.
FOCUS AREA: ACCESSIBILITY	39. Design digital products and systems that follow accessibility standards, including the Americans with Disabilities Act (ADA), and address the needs of all users to reduce barriers caused by disability, digital divides, or bias.

Conceptual Framework Theme:
Digital Proficiency

Each content standard completes the stem, "Students will…"

Grades 9-12	
FOCUS AREAS: INFORMATION LITERACY	40. Research and report potential dangers and unintended consequences of over-reliance on AI tools. [AI] *Examples: misinformation, disinformation, implicit bias*
FOCUS AREA: DIGITAL LIFE	41. Explain how systems learn user preferences and behaviors to deliver personalized content and targeted advertisements. [AI]
	42. Research the mental health risks associated with excessive technology use, including isolation, anxiety, and depression.
FOCUS AREA: DIGITAL TOOLS	43. Design and develop a software application for broad audiences, incorporating feedback from real-world users.
	44. Identify a problem that cannot be solved by humans alone or by machines alone and discuss a solution for it, decomposing the task into sub-problems suited for a human or a machine to accomplish.

GRADES 9-12

Glossary

Compression: The process of reducing the size of a computational artifact (e.g., a file) using a digital tool which implements an algorithm that recognizes repetitive data and removes redundancy across the artifact.
Control Structures: Fundamental programming constructs that dictate the flow of execution in a program.
Digital divide: The gap between people with access to technology and those without access. The disparity could be caused by differences in access to devices, Internet connectivity or digital literacy skills.
Encryption: The process of converting information or data into a text (often called ciphertext) that is not readable by a human.
Geolocation: The process or technique of identifying the physical location of a person or device by means of digital information processed via the Internet.
Input: A device or component that allows information to be received by a computer.
Interface: Common boundary between independent systems or modules where interactions take place.
Iterative design process: A step-by-step approach to creating and improving a project by testing, making changes, and refining it multiple times based on feedback.
Library: A collection of pre-written, reusable code modules or functions that programmers can incorporate into their projects to add specific functionalities without having to write them from scratch.
Lossless algorithms: A compression algorithm where the original data can be perfectly reconstructed without the loss of information.
Lossy algorithms: A compression algorithm where some of the original information is discarded to achieve a smaller compressed size.
Metadata: A set of data that provides information about other data.
Pseudocode: A notation resembling a simplified programming language, used in program design.
Refactor: To reorganize and restructure existing code without changing its functionality.
Rules-based algorithm: A type of algorithm that uses a set of predefined rules to make decisions or solve problems.
Supervised, unsupervised, and reinforcement learning: The three main paradigms in machine learning. Supervised learning uses labeled data to train models for prediction tasks, like classification or regression. Unsupervised learning explores unlabeled data to discover hidden patterns and structures, like clustering or dimensionality reduction. Reinforcement learning trains agents to make decisions in an environment to maximize a reward, often through trial and error.
Two-factor authentication: A security mechanism that requires two types of credentials for authentication and is designed to provide an additional layer of validation, minimizing security breaches (e.g., a password, and a text message confirmation).