

**Strand 1: CS Investigations Practices** - Students will employ the following practices throughout the course. They provide a framework and serve as helpful reminders of the high-level skills and dispositions they should be continually developing

**Standard 1: Critical Thinking**

Use the structured problem-solving process to help address new problems p. 495

View challenges as solvable p. 504

Break down larger problems into smaller components (decomposition?)

**Standard 2: Persistence**

Expect and value mistakes as a natural and productive part of problem solving p. 48

Continue working towards solutions despite setbacks

Iterate and continue to improve partial solutions

**Standard 3: Creativity** p. 494

Incorporate personal interests and ideas into activities and projects

Experiment with new ideas and consider multiple possible approaches

Extend or build upon the ideas and projects of others

**Standard 4: Collaboration** p. 502

Work with others to develop solutions that incorporate all contributors p. 503

Mediate disagreements and help teammates agree on a common solution

Actively contribute to the success of group projects p. 503

**Standard 5: Communication**

Structure work so that it can be easily understood by others

Consider the perspective and background of your audience when presenting your work p. 500

Provide and accept constructive feedback in order to improve your work p. 502

**Strand 2: Computing Systems** - Human interaction with computing systems. Students will understand that computing systems (devices) are made up of a wide variety of computing components that collect, store, analyze, and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form. They will also understand techniques that are useful when troubleshooting a computing system that does not work as intended

**Standard 1: Students will identify different types of computing devices they encounter in their everyday life including laptops, desktops, mobile devices, gaming systems, wearable technology and embedded systems (drones, car systems, smart houses, etc.).**

Identify required functions for a device to be classified as a computer (input, processing; output; storage) p. 2

Identify examples of tasks that can and cannot be accomplished with a computer p. 1

**Standard 2: Students will explain the purpose of and interaction between key functional components of a computer**

including processor, RAM, ROM, hard drive, and input and output devices pp. 3-6

**Standard 3: Students will demonstrate an understanding of gigahertz, kilobyte, megabyte, gigabyte, and terabyte in relation to current computing devices**

**Standard 4: Students will explain the interrelation of the operating system software, application software, and utility software, citing specific examples of each** pp. 7-8

**Standard 5: Students will diagnose and solve routine hardware and software problems that occur during everyday computer use. (e.g., reboot/restart, power, connections, cables, ports, network resources, video, sound)**

**Strand 3: Networks & The Internet - Students will understand that networks connect computing systems to share information and resources which are an increasingly integral part of computing. Data is transmitted across multiple networks to other computing devices. The confidential nature of data requires cybersecurity measures to continually monitor and protect computers, networks, programs, and data from unauthorized or unintentional access, manipulation, or destruction**

**Standard 1: Students will understand and describe the network system that makes up the Internet**

**Standard 2: Students will investigate web search algorithms and how search engines work (crawling, indexing and ranking websites)**

**Standard 3: Students will describe how packets are used to send and receive data and what happens to the data when it experiences packet loss**

**Standard 4: Students will evaluate how various physical and digital security measures protect electronic information and how a lack of such measures could lead to vulnerabilities. (cybersecurity)** p. 530

**Standard 5: Students will investigate multiple methods of secure transmission of information. (i.e.: encryption, firewalls, VPNs)** p. 532

**Strand 4: Impacts of Computing - Students will realize the effects that computing has on daily life in both positive and negative ways. Individuals and communities influence computing through their behaviors and cultural and social interactions, and in turn, computing influences new cultural practices at local, national, and global levels. An informed and responsible person should understand the social implications of the digital world, including validity, equity, and access to computing**

**Standard 1: Students will evaluate the quality of digital sources for reliability, including currency, relevancy, authority, accuracy, and purpose of digital information**

Relate the distribution of computing resources in a global society to issues of equity, access, and power.

p. 513

Evaluate the bias of digital information sources, including websites.

p. 524

Evaluate how media and technology can be used to distort, exaggerate, and misrepresent information

p. 524

**Standard 2: Students will identify some of the tradeoffs associated with computing technologies that can affect people's everyday activities and career options**

**Standard 3: Students will be able to identify issues of bias and accessibility in the design and functionality of existing technologies** pp. 512-513

**Standard 4: Students will understand the ethical responsibility to society when creating apps or programs- including the following: empathy with the end user, improving the world around you, efficiency-making things easier, potential liability for misuse, potential security issues** pp. 525-527

**Standard 5: Students will be able to explain the benefits and risks associated with sharing information digitally**

Appropriate uses of social media in personal, educational, extra-curricular, professional, and community scenarios p. 525

Permanence of online information

Appropriate methods of communication for personal, educational, extra-curricular, professional, and community situations p. 525

Online safety [password/passphrase, personal information, location (GPS), sharing images, talking to/ meeting up with strangers, financial information, names, and addresses] pp. 531-533

**Strand 5: Problem Solving & Programming** - Students will understand that an algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are then translated into programs, or code, to provide instructions for computing devices. Programs control all computing systems and empower people to communicate with the world in new ways and solve compelling problems

**Standard 1: Problem Solving**

Define - Understand the Problem p. 46

Prepare - Plan the Solution (design via pseudocode/flowcharts) p. 46

Try - Carry out the Plan (Code) p. 46

Reflect - Review and Discuss your Solution (Testing / Feedback) p. 46

**Standard 2: Program Design**

Students will identify how planning strategies (such as flowcharts, storyboards, prototypes or pseudocode) are used when creating a program p. 115

**Standard 3: Algorithms**

Define an algorithm as a set of clearly defined, logical steps to solve a problem p. 46

Students will describe the steps needed to efficiently solve a non-computing problem using a pseudo- code algorithm p. 46

Students will examine traditional programming algorithms including searches, sorts, and/or minimal spanning trees. p. 153

Students will examine and formulate algorithms that solve specific problems p. 124

**Standard 4: Input/Output**

Students will recognize a variety of different user input sources such as text input, sensors, mouse response, movement, or event. Students will recognize a variety of different outputs such as sounds, light, vibrations, movement, text and/or graphics pp. 122-126

**Standard 5: Variables**

Students will understand that variables are named locations in memory. p. 125

Students will be able to identify variables and when they should be used in code pp. 125-128

**Standard 6: Loops**

Students will understand that programs use loops (iteration) to be more efficient and avoid code duplication p. 218

**Standard 7: Conditionals**

Students will understand that programs use conditionals to perform different computations or actions based on whether a condition is true or false (Booleans) pp. 175-176

**Standard 8: Operators**

Students will understand that programs use mathematical symbols (+, -, \*, /, >, <, ==, AND, OR) in a program to perform specific operations (mathematical, relational, or logical) and produce a single result pp. 151-156

**Standard 9: Functions**

Students will understand that a function is a named block of code that performs a specific task. Functions encourage efficiency, reusability, and readability pp. 302-309

**Standard 10: Debugging**

Students will understand that debugging is finding and removing errors from a program so it can operate as intended. Strategies students might learn for debugging could include pp. 387-388

Guess and Check

Deactivating sections to identify problematic code

Looking for typos, missing tags, or incorrect syntax  
Making the problem smaller - identifying important points (changing variable values, getting input, etc.)  
Asking a friend or team member for help  
Printing, watching, or changing variable values while the program runs  
Using a debugging tool  
Thinking about when the code last worked and what you have added since then

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**Strand 6: Data & Analysis - Students will recognize data exists in many formats and computing systems are used to process that data. Data is collected, stored, and analyzed to better understand the world, make decisions and make more accurate predictions**

**Standard 1: Binary Code**

Students will define a binary system as one that uses just two possible states to represent information	p. 24
Students will define a bit as a single piece of binary information	p. 19
Students will be familiar with common features of systems used to represent information in binary, ASCII, and images	pp. 27-29
Students will use the ASCII system to encode and decode text information in binary	pp. 27-29
Students will use a binary system to represent numbers	pp. 24-26
Students will describe common features of systems used to represent information in binary	p. 29

**Standard 2: Data Collection and Analysis**

Students will collect and/or generate their own data related to local community issues and discuss appropriate methods for data collection and aggregation of data necessary to support making a case of facilitating a discovery