Arkansas Computer Science and Computing

Programming - Year 1

Computational Thinking and Problem Solving

1 **Students will analyze and utilize problem-solving strategies.**

1 Leverage problem-solving strategies to solve problems of level-appropriate complexity CSPG.Y1.1.1

2 Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity CSPG.Y1.1.2

3 Analyze and utilize collaborative methods in problem solving of level-appropriate complexity CSPG.Y1.1.3

4 Analyze and utilize level-appropriate troubleshooting strategies for hardware and software CSPG.Y1.1.4

5 This standard is not specifically required until Year 2 CSPG.Y1.1.5

2 **Students will analyze and utilize connections between concepts of mathematics and computer science.**

1 Interpret relational and logical expressions of levelappropriate complexity using comparison and Boolean operators CSPG.Y1.2.1

2 Classify the types of information that can be stored as variables and analyze the appropriateness of each (e.g., Booleans, characters, integers, floating points, strings) CSPG.Y1.2.2

3 Analyze how computer science concepts relate to the field of mathematics CSPG.Y1.2.3

4 Discuss and apply concepts of abstraction CSPG.Y1.2.4

5 Perform operations of level-appropriate complexity with binary, decimal, and hexadecimal numbers CSPG.Y1.2.5

6 Demonstrate operator precedence in expressions and statements CSPG.Y1.2.6

Data, Information, and Security

3 Students will analyze and utilize data through the use of computing devices.

1. Define, store, access, and manipulate levelappropriate data (e.g., primitive, linear) CSPG.Y1.3.1
2. Define and discuss different examples of levelappropriate quantitative and qualitative data CSPG.Y1.3.2
3. This standard is not specifically required until Year 2 CSPG.Y1.3.3
4. Analyze, utilize, and visually represent levelappropriate data CSPG.Y1.3.4
5. Perform level-appropriate data analysis using computing tools CSPG.Y1.3.5
6. This standard is not specifically required until Year 2 CSPG.Y1.3.6

4 Students will analyze and utilize concepts of cybersecurity.

1. Identify the five pillars of cybersecurity and evaluate the relevance of each pillar to computer science concepts CSPG.Y1.4.1
2. Research and describe different roles within the hacking community (e.g., white hat, black hat, gray hat hacking), including positive and negative motivations, significant impacts, and social stereotypes CSPG.Y1.4.2
3. Research and describe the impacts of ransomware, trojans, viruses, and other malware CSPG.Y1.4.3
4. Explain implications related to identification and responsible reporting of a vulnerability versus exploitation CSPG.Y1.4.4

Algorithms and Programs

5 Students will create, evaluate, and modify algorithms.

1. Design and implement level-appropriate algorithms that use iteration, selection, and sequence CSPG.Y1.5.1
2. Illustrate the flow of execution of algorithms in levelappropriate programs including branching and looping CSPG.Y1.5.2
3. Evaluate the qualities of level-appropriate studentcreated and non-student-created algorithms CSPG.Y1.5.3
4. Use a systematic approach to detect and resolve errors in a given algorithm CSPG.Y1.5.

6 Students will create programs to solve problems.

1. Create programs using procedures to solve problems of level-appropriate complexity CSPG.Y1.6.1
2. Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace) CSPG.Y1.6.2
3. Determine the scope and state of variables declared in procedures and control structures over time CSPG.Y1.6.3
4. Create programs of level-appropriate complexity that read from standard input, write to standard output, read from a file, write to a file, and append to a file CSPG.Y1.6.4
5. Use a systematic approach to detect logic, runtime, and syntax errors within a program CSPG.Y1.6.5

Computers and Communications

7 Students will analyze the utilization of computers within industry.

1. Identify software and hardware specific to carrying out the mission of regional industries CSPG.Y1.7.1
2. Research advancing and emerging technologies (e.g., artificially intelligent agents, blockchain, extended reality, Internet of Things (IoT), machine learning, robotics) CSPG.Y1.7.

8 Students will analyze communication methods and systems used to transmit information among computing devices.

1. Utilize the command line to accomplish common network troubleshooting tasks at an introductory level CSPG.Y1.8.1
2. Research and describe common networking concepts at an introductory level CSPG.Y1.8.2
3. Research and describe modems, network interface cards, routers (e.g., consumer, industrial), switches, and wireless access points, and identify their purposes within a network CSPG.Y1.8.3
4. Describe the importance of creating and using common rules for communication and the utilization of common network protocols including the relationship between client and server CSPG.Y1.8.

9 Students will utilize appropriate hardware and software.

1. Compare and contrast computer programming paradigms (e.g., functional, imperative, objectoriented) CSPG.Y1.9.1
2. Research, describe, and utilize at an appropriate level: CSPG.Y1.9.2
   a. debugging strategies CSPG.Y1.9.2.A
   b. integrated development environments (IDE) CSPG.Y1.9.2.B
   c. source-code editors CSPG.Y1.9.2.C
   d. version control strategies CSPG.Y1.9.2.D
3. Classify layers of software (e.g., applications, drivers, firmware, operating systems) utilized within various platforms (e.g., Android, ChromeOS, iOS, Linux, macOS, Windows) CSPG.Y1.9.3
4. Identify and describe the purpose of hardware components within various personal computing platforms CSPG.Y1.9.4

Professionalism and Impacts of Computing

10 Students will analyze the impacts of technology and professionalism within the computing community.

1. Research and describe the risks and risk mitigation strategies associated with the utilization and implementation of social media and other digital technology implications CSPG.Y1.10.1
2. This standard is not specifically required until Year 2 CSPG.Y1.10.2
3. Research and describe the potential benefits associated with the utilization and implementation of social media and other digital technologies CSPG.Y1.10.3
4. Research and describe the relationship between access and security (e.g., active and passive data, convenience, data mining, digital marketing, online wallets, privacy, theft of personal information) CSPG.Y1.10.4
5. This standard is not specifically required until Year 2 CSPG.Y1.10.5
6. Research the history of computing devices and their impact on society CSPG.Y1.10.6
7. Research and identify diverse careers and career opportunities (e.g., accessibility, availability, demand) that are influenced by computer science and the technical and soft skills needed for each CSPG.Y1.10.7
8. This standard is not specifically required until Year 2 CSPG.Y1.10.8
9. This standard is not specifically required until Year 2 CSPG.Y1.10.9

11 **Students will demonstrate understanding of storytelling with data and appropriately communicate about technical information.**

1. Communicate basic technical information effectively to diverse audiences including, but not limited to, non-technical audience members `CSPG.Y1.11.1`
2. Describe and utilize the concepts of storytelling with data `CSPG.Y1.11.2`
3. Describe the following common types of data bias: `CSPG.Y1.11.3`
   a. confirmation bias `CSPG.Y1.11.3.A`
   b. confounding variables `CSPG.Y1.11.3.B`
   c. outliers `CSPG.Y1.11.3.C`
   d. overfitting/underfitting `CSPG.Y1.11.3.D`
   e. selection bias `CSPG.Y1.11.3.E`
4. Compare and contrast causation and correlation `CSPG.Y1.11.4`
5. Compare and contrast interpreting data, inferring using data, and implicating with data `CSPG.Y1.11.5`