California Computer Science

Grades K-2

Computing Systems

a Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences. K-2.CS.1

1 People use computing devices to perform a variety of tasks accurately and quickly. Computing devices interpret and follow the given instructions literally. Students select and operate an appropriate computing device and corresponding program or app for a given task.

b Explain the functions of common hardware and software components of computing systems. K-2.CS.2

1 A computing system is composed of hardware and software. Hardware includes the physical components of a computer system. Software provides instructions for the system. These instructions are represented in a form that a computer can understand and are designed for specific purposes. Students identify and describe the function of hardware, such as desktop computers, laptop computers, tablet devices, monitors, keyboards, mice, trackpads, microphones, and printers. Students also identify and describe common software applications such as web browsers, games, and word processors.

c Describe basic hardware and software problems using accurate terminology. K-2.CS.3

1 Problems with computing systems have different causes. Accurate description of the problem aids users in finding solutions. Students communicate a problem with accurate terminology (e.g., when an app or program is not working as expected, a device will not turn on, the sound does not work, etc.). Students at this level do not need to understand the causes of hardware and software problems.

Networks & Internet

a Model and describe how people connect to other people, places, information and ideas through a network. K-2.NI.4

1 Information is passed between multiple points (nodes) on a network. The Internet is a network that enables people to connect with other people worldwide through many different points of connection. Students model ways that people communicate, find information, or acquire ideas through a network. Students use a network, such as the internet, to access information from multiple locations or devices.

b **Explain why people use passwords.** K-2.NI.5

1 Passwords protect information from unwanted use by others. When creating passwords, people often use patterns of familiar numbers and text to more easily remember their passwords. However, this may make the passwords weaker. Knowledge about the importance of passwords is an essential first step in learning about cybersecurity. Students explain that strong passwords are needed to protect devices and information from unwanted use.

c **Create patterns to communicate a message.** K-2.NI.6

1 Connecting devices to a network or the Internet provides great benefit, but care must be taken to protect devices and information from unauthorized access. Messages can be protected by using secret languages or codes. Patterns help to ensure that the intended recipient can decode the message. Students create a pattern that can be decoded and translated into a message.

Data & Analysis

a **Store, copy, search, retrieve, modify, and delete information using a computing device, and define the information stored as data.** K-2.DA.7

1 Information from the real world can be stored and processed by a computing device. When stored on a computing device, it is referred to as data. Data can include images, text documents, audio files, and video files. Students store, copy, search, retrieve, modify, and delete information using a computing device and define the information stored as data.

b **Collect and present data in various visual formats.** K-2.DA.8

1 Data can be collected and presented in various visual formats.

c **Identify and describe patterns in data visualizations, such as charts or graphs, to make predictions.** K-2.DA.9

1 Data can be used to make inferences or predictions about the world.

Algorithms & Programming

a **Model daily processes by creating and following algorithms to complete tasks.** K-2.AP.10

1 Algorithms are sequences of instructions that describe how to complete a specific task. Students create algorithms that reflect simple life tasks inside and outside of the classroom.

b **Model the way programs store data.** K-2.AP.11

1 Information in the real world can be represented in computer programs. Students model the digital storage of data by transforming real-world information into symbolic representations that include text, numbers, and images.

c **Create programs with sequences of commands and simple loops, to express ideas or address a problem.** K-2.AP.12

1 People create programs by composing sequences of commands that specify the precise order in which instructions should be executed. Loops enable programs to repeat a sequence of commands multiple times.

d **Decompose the steps needed to solve a problem into a sequence of instructions.** K-2.AP.13

1 Decomposition is the act of breaking down tasks into simpler tasks. For example, students could break down the steps needed to make a peanut butter and jelly sandwich, to brush their teeth, to draw a shape, to move a character across the screen, or to solve a level of a coding app. In a visual programming environment, students could break down the steps needed to draw a shape.

e **Develop plans that describe a program's sequence of events, goals, and expected outcomes.** K-2.AP.14

1 Creating a plan for what a program will do clarifies the steps that will be needed to create the program and can be used to check if a program runs as expected. Students create a planning document to illustrate their program's sequence of events, goals, and expected outcomes of what their program will do. Planning documents could include a story map, a storyboard, or a sequential graphic organizer, to illustrate their program's sequence of events, goals, and expected outcomes of what their program will do. Students at this level may complete the planning process with help from the teacher.

f **Give attribution when using the ideas and creations of others while developing programs.** K-2.AP.15

1 Computing makes it easy to reuse and remix others' creations, and this comes with a level of responsibility. Students credit artifacts that were created by others, such as pictures, music, and code. Credit could be given orally if presenting their work to the class, or in writing if sharing work on a class blog or website. Proper attribution at this stage does not require formal citation, such as in a bibliography or works cited document.

g **Debug errors in an algorithm or program that includes sequences and simple loops.** K-2.AP.16

1 Algorithms or programs may not always work correctly. Students use various strategies, such as changing the sequence of the steps, following the algorithm in a step-by-step manner, or trial and error to fix problems in algorithms and programs.

h **Describe the steps taken and choices made during the iterative process of program development.** K-2.AP.17

1 Program developers make choices and iterate to continually refine their product. At this stage, students explain or write about the goals and expected outcomes of the programs they create and the choices that they made when creating programs. Students could use coding journals, discussions with a teacher, class presentations, or blogs.

Impacts of Computing

a **Compare how people lived and worked before and after the adoption of new computing technologies.** K-2.IC.18

1 Computing technologies have changed the way people live and work. Students describe the positive and negative impacts of these changes. For example, as a class, students could create a timeline that includes advancements in computing technologies. Each student could then choose an advancement from the timeline and make a graphic organizer noting how people's lives were different before and after its introduction into society.

b **Work respectfully and responsibly with others when communicating electronically.** K-2.IC.19

1 Electronic communication facilitates positive interactions, such as sharing ideas with many people, but the public and anonymous nature of electronic communication also allows intimidating and inappropriate behavior in the form of cyberbullying. Responsible electronic communication includes limiting access to personably identifiable information. Students learn and use appropriate behavior when communicating electronically (often called "netiquette").

c **Describe approaches and rationales for keeping login information private, and for logging off of devices appropriately.** K-2.IC.20

1 People use computing technology in ways that can help or hurt themselves and/or others. Harmful behaviors, such as sharing passwords or other private information and leaving public devices logged in should be recognized and avoided. Students keep login information private, log off of devices appropriately, and discuss the importance of these practices.