By the end of grade 2

Computing Systems 2.CS

People interact with a wide variety of computing devices 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.

1 Individuals use computing devices to perform a variety of tasks accurately and quickly. Computing devices interpret and follow the instructions they are given literally. 2.CS.1

1. Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences. 8.1.2.CS.1

2 A computing system is composed of software and hardware. 2.CS.2

2. Explain the functions of common software and hardware components of computing systems 8.1.2.CS.2

3 Describing a problem is the first step toward finding a solution when computing systems do not work as expected. 2.CS.3

3. Describe basic hardware and software problems using accurate terminology 8.1.2.CS.3

Networks and the Internet 2.NI

Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world.

1 Computer networks can be used to connect individuals to other individuals, places, information, and ideas. The Internet enables individuals to connect with others worldwide. 2.NI.1

2. Describe how the Internet enables individuals to connect with others worldwide. 8.1.2.NI.2

1. Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network. 8.1.2.NI.1

2 Connecting devices to a network or the Internet provides great benefits, but care must be taken to use authentication measures, such as strong passwords, to protect devices and information from unauthorized access. 2.NI.2

3. Create a password that secures access to a device. Explain why it is important to create unique passwords that are not shared with others. 8.1.2.NI.3

3. Create a password that secures access to a device. Explain why it is important to create unique passwords that are not shared with others. 8.1.2.NI.3

Impacts of Computing 2.IC

Computing affects many aspects of the world in both positive and negative ways at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions, and, in turn, computing influences new cultural practices.

1 Computing technology has positively and negatively changed the way individuals live and work (e.g., entertainment, communication, productivity tools). 2.IC.1

1. Compare how individuals live and work before and after the implementation of new computing technology. 8.1.2.IC.1

Data & Analysis 2.DA

Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.

1 Individuals collect, use, and display data about individuals and the world around them. 2.DA.1

1. Collect and present data, including climate change data, in various visual formats. 8.1.2.DA.1

2 Computers store data that can be retrieved later. Data can be copied, stored in multiple locations, and retrieved. 2.DA.2

2. Store, copy, search, retrieve, modify, and delete data using a computing device. 8.1.2.DA.2

3 Data can be used to make predictions about the world. 2.DA.3

4. Make predictions based on data using charts or graphs. 8.1.2.DA.4

3. Identify and describe patterns in data visualizations 8.1.2.DA.3

Algorithms & Programming 2.AP

An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems.

1 Individuals develop and follow directions as part of daily life. A sequence of steps can be expressed as an algorithm that a computer can process. 2.AP.1

1. Model daily processes by creating and following algorithms to complete tasks. 8.1.2.AP.1

2 Real world information can be stored and manipulated in programs as data (e.g., numbers, words, colors, images). 2.AP.2

2. Model the way programs store and manipulate data by using numbers or other symbols to represent information. 8.1.2.AP.2

3 Computers follow precise sequences of steps that automate tasks. 2.AP.3

3. Create programs with sequences and simple loops to accomplish tasks. 8.1.2.AP.3

4 Complex tasks can be broken down into simpler instructions, some of which can be broken down even further. 2.AP.4

4. Break down a task into a sequence of steps. 8.1.2.AP.4

5 People work together to develop programs for a purpose, such as expressing ideas or addressing problems.The development of a program involves identifying a sequence of events, goals, and expected outcomes, and addressing errors (when necessary). 2.AP.5

6. Debug errors in an algorithm or program that includes sequences and simple loops. 8.1.2.AP.6

5. Describe a program's sequence of events, goals, and expected outcomes. 8.1.2.AP.5

Engineering Design 2.ED

People design for enjoyment and to solve problems, extend human capabilities, satisfy needs and wants, and improve the human condition. Engineering Design, a systematic approach to creating solutions to technological problems and finding ways to meet people's needs and desires, allows for the effective and efficient development of products and systems.

1 Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions. 2.ED.1

- 3. Select and use appropriate tools and materials to build a product using the design process. 8.2.2.ED.3
- 2. Collaborate to solve a simple problem, or to illustrate how to build a product using the design process. 8.2.2.ED.2
- 1. Communicate the function of a product or device. 8.2.2.ED.1

2 Limitations (constraints) must be considered when engineering designs. 2.ED.2

- 4. Identify constraints and their role in the engineering design process. 8.2.2.ED.4

Interaction of Technology and Humans 2.ITH

Societies influence technological development. Societies are characterized by common elements such as shared values, differentiated roles, and cultural norms, as well as by entities such as community institutions, organizations, and businesses. Interaction of Technology and Humans concerns the ways society drives the improvement and creation of new technologies, and how technologies both serve and change society.

1 Human needs and desires determine which new tools are developed. 2.ITH.1

- 2. Explain the purpose of a product and its value. 8.2.2.ITH.2
- 1. Identify products that are designed to meet human wants or needs. 8.2.2.ITH.1

2 Technology has changed the way people live and work.Various tools can improve daily tasks and quality of life. 2.ITH.2

- 4. Identify how various tools reduce work and improve daily tasks. 8.2.2.ITH.4
- 3. Identify how technology impacts or improves life. 8.2.2.ITH.3
- 5. Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution. 8.2.2.ITH.5

Nature of Technology 2.NT

Human population, patterns and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability, landforms, and locations of various natural hazards and their effects on population size, composition, and distribution.

1 Innovation and the improvement of existing technology involves creative thinking. 2.NT.1

- 2. Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem. 8.2.2.NT.2
- 1. Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together. 8.2.2.NT.1

Effects of Technology on the Natural World 2.ETNW

Many of engineering and technology's impacts on society and the environment are widely regarded as desirable. However, other impacts are regarded as less desirable. Effects of Technology on the Natural World concerns the positive and negative ways that technologies affect the natural world.

1 The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals.Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants.Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment. 2.ETW.1

- 3. Describe or model the system used for recycling technology. 8.2.2.ETW.3
- 2. Identify the natural resources needed to create a product. 8.2.2.ETW.2
- 1. Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.1
- 4. Explain how the disposal of or reusing a product affects the local and global environment. 8.2.2.ETW.4

Ethics & Culture 2.EC

Ethics and Culture concerns the profound effects that technologies have on people, how those effects can widen or narrow disparities, and the responsibility that people have for the societal consequences of their technological decisions.

1 The availability of technology for essential tasks varies in different parts of the world. 2.EC.1

- 1. Identify and compare technology used in different schools, communities, regions, and parts of the world. 8.2.2.EC.1