1st Grade CS Lessons

Students learn foundational concepts by integrating basic digital literacy skills with simple ideas about computational thinking. Students learn that tools help people do things better, or more easily, or do some things that could otherwise not be done at all. Through the exploration of differences between humans, computing devices, and digital tools, students begin to understand if, when, and how they should use technology. By the end of first grade, the computer science literate student will recognize user needs and preferences while utilizing devices to perform basic computer operations, hardware, software, and apply basic troubleshooting strategies. Students will explain and practice the importance of password protection and discuss how computer networks can connect people globally. With teacher guidance, students will collect, transform, and explain how different types of data can be stored and retrieved from a computing device. First grade students will develop an understanding of how to model and identify algorithms and programs using loops and step by step instructions. First grade students will discuss the impacts of computing, including how people lived and worked before and after the implementation of new technology, how to work responsibly online, the importance of keeping login information private and logging off devices appropriately.

Completing the Course in Code.org will fulfill all of the CS standards!

COMPUTING SYSTEMS

1.CS.D.1 Computing Systems Devices	**With teacher guidance, select and operate appropriate devices and software to perform a task.** People use computing devices to perform a variety of tasks accurately and quickly. With teacher guidance students should be able to select the appropriate app/program to use for tasks they are required to complete. For example, if students are asked to draw a picture, they should be able to open and use a drawing app/program to complete this task. *Practice(s): Fostering an inclusive Computing Culture, Communicating About Computing: 1.2, 7.3*
You're already doing it!!	When guiding students to perform a task, indicate the program you want them to use then indicate why. Additionally, you can ask them which program would best complete the task at hand. Here are some examples: ● We're going to open a Google Doc because we use Google Docs to create documents. ● We're going to open Google Drawing because it is a program used for drawing ● Click on Google Chrome. Chrome is the browser we use to access the internet ● We're going to make a presentation. Do you think we should use Google Slides or Google Docs (both are correct so ask them why they chose it)
Extensions	Have students decide which program would work best to complete a task Use different types of programs for projects - create charts in Sheets, presentations in Slides, write papers in Docs, find images and do research using Google

1.CS.HS.1 Computer	**Use appropriate terminology in identifying and describing the function of common physical components of computing systems.** A computing system is composed of hardware and software. Hardware consists of

Systems Hardware & Software	physical components. Students should be able to identify and describe the function of external hardware, such as desktop computers, laptop computers, tablet devices, monitors, keyboards, mice, and printers. Students should be able to identify software such as: web browsers, games, etc. *Practice(s): Communicating about Computing: 7.2*
You're already doing it!!	The best way to guide students to mastering this standard is to use proper terminology while talking to them about their computers. Include computer terms when they are learning words
Extensions	Computer parts lesson plan (from Bloom Into EdTech blog) Computer parts flash cards Computer parts memory game (this picture dictionary could be cut out to make a memory game!) Video about computer parts (3:11) Parts of a computer slideshow and game

1.CS.T.2 Computer Systems Troubleshooting	**With teacher guidance, begin to use basic troubleshooting strategies.** Students would be able to use simple troubleshooting strategies. For example, turning a device off and on to reboot it, closing and reopening an app, turning on speakers, or plugging in headphones, and then adjusting volume. *Practice(s): Testing and Refining Computational Artifacts: 6.2*
You're already doing it!!	When a student presents an issue "My ChormeBook isn't working", have them articulate the problem. Have them use descriptive words and appropriate terminology, then discuss possible solutions. For example: Student: My screen is black Teacher: Your monitor is black? Do you think the battery died? Should we plug it in? Student: My game's not working!! Teacher: You're not at the correct website. Maybe we should check to make sure you entered the URL correctly Student: My computer is locked up Teacher: Try restarting it (then show them how!)
Extensions	As part of your rotating classroom jobs, include an IT Specialist(Information Technology) assignment. Have this student responsible for making sure the ChromeBooks are plugged in accurately at the end of class. Allow them to be the "expert" that students go to first. Identify experts within the classroom (in groups, at tables, etc.) that students should ask before coming to the teacher for help.

NETWORKS & THE INTERNET

1.NI.C.1 Networks & Internet Cybersecurity	**Explain what passwords are and why we use them to protect personal information (e.g., name, location, phone number, home address) and keep it private.** Connecting devices to a network or the Internet provides great benefit, care must be taken to use authentication measures, such as strong passwords, to protect devices and information from unauthorized access. This is an essential first step in learning about cybersecurity. For example, first grade students should be able to accurately enter a password to log on to a program and understand the importance of keeping passwords private in order to protect their personal information. *Practice(s): Communicating About Computing: 7.2*
You're already doing it!!	Discuss with students why we don't share passwords. Login information should be kept private to protect the documents on your computer. Additionally, it protects you from having someone do something they shouldn't be doing under YOUR name!! Don't allow students to use another student's QR code
Extensions	Compare passwords to the combination on a bicycle lock! As the year progresses, begin having students login by typing their username and password rather than using the QR Codes. Print their usernames and passwords on the back of their QR Codes so they can practice! Discuss that their passwords include letters and numbers to make it more difficult to steal! Password and Internet Security video (7:50) up until 1:45 is about passwords. Color your password! Password rap video (2:00)

1.NI.NCO.1 Networks & Internet Cybersecurity	**With teacher guidance, students discuss how computer networks can be used to connect people to other people, places, information, and ideas.** Small, wireless devices, such as cell phones, communicate with one another through a series of intermediary connection points, such as cellular towers. This coordination among many computing devices allows a person to voice call a friend or video chat with a family member. Details about the connection points are not expected at this level. For example, students will participate in a class discussion about how different networks connect people, places, things and information, such as a phone call to grandma in another state, using Facetime or Skype to connect with a content area expert, connecting devices via Bluetooth, or accessing an online game through Wi-Fi. *Practice(s): Communicating About Computing: 7.2*
You're already doing it!!	When connecting wirelessly to the projector, using the chromebooks with WiFi, etc. explain what you are doing! "I'm going to connect wirelessly to the projector!" Discussions with students about how we are connected with people - phone, video calls, etc.
Extensions	What is the Internet (2:23)

DATA & ANALYSIS

1.DA.CVT.1 Data and Analysis Collection Visualization & Transformation	**With teacher guidance, collect and transform data using digital devices; Display data for communication in various visual formats.** The collection and use of data about the world around them is a routine part of life and influences how people live. Many everyday objects, such as cell phones, digital toys, and cars, can contain tools (such as sensors) and computers to collect and display data from their surroundings. Students could collect data on the weather, such as sunny days versus rainy days, the temperature at the beginning of the school day and end of the school day, or the inches of rain over the course of a storm. Students could count the number of pieces of each color of candy in a bag of candy, such as Skittles or M&Ms. Students could create surveys of things that interest them, such as favorite foods, pets, or TV shows, and collect answers to their surveys from their peers and others. The data collected could then be organized into two or more visualizations, such as a bar graph, pie chart, or pictograph. *Practice(s): Communicating About Computing, Developing and Using Abstractions: 7.1, 4.2*
You're already doing it!!	Counting, sorting and graphing in Math Collecting data in Science Recording reading minutes/log
Extensions	Students can create pictographs (abcya.com paint - using the shape, stamp or sticker tools) Or with Google Drawings Enter data in a Google Sheet and create a chart (put a link to the sheet on the teacher directed website and students can easily access it!) make a different sheet for every student to enter their data (example)

1.DA.S.1 Data & Analysis Storage	**Explain that a variety of data (e.g., music, video, images, and text) can be stored in and retrieved from a computing device.** All information stored and processed by a computing device is referred to as data. Data can be images, text documents, audio files, software programs or apps, video files, etc. It can be retrieved, copied, and stored in multiple places. As students use software to complete tasks on a computing device, they will be manipulating data. For example, first graders should be able to retrieve files that they previously created and saved, such as, locating and opening a word processing program they saved the previous day. Practice(s): Developing and Using Abstractions: 4.3
You're already doing it!!	Any time students create, open and reopen documents they are learning that the files created were saved! When creating files teach students to NAME THE FILE and create folders to ORGANIZE THEIR DRIVE so they can locate files later!

	Use the SEARCH bar in Google drive to locate files. Advanced search is also a possibility!
Extensions	Create documents in google Docs and open them again later! You can even create a template document and force a copy like this!!

1.DA.IM.1 Data & Analysis Inference & Models	**Identify patterns in data to make inferences or predictions.** Data can be used to make inferences or predictions about the world. Students could analyze a Graph and pie chart of the colors in a bag of candy, identify the patterns for which colors are most and least represented, and then make a prediction as to which colors will have most and least in a new bag of candy. *Practice(s): Developing and Using Abstractions: 4.4*
You're already doing it!!	Analyzing charts (behavior, reading, etc) Graphs in Math / Science Predicting the end of a story Using context clues when reading Goal setting
Extensions	Create charts in Google Sheets from data students have collected. Have students compare their charts with each other! Have students enter their reading log data into a premade spreadsheet! (example)

ALGORITHMS & PROGRAMMING

1.AP.A.1 Algorithms & Programming Algorithms	**Model daily processes by following algorithms (sets of step-by-step instructions) to complete tasks.** Routines, such as morning meeting, clean-up time, and dismissal, are examples of algorithms that are common in many early elementary classrooms. For example, students begin to understand and model daily step-by-step processes, such as brushing teeth, implementing a morning procedure, or following a simple recipe as "algorithms" that lead to an end result. *Practice(s): Developing and Using Abstractions: 4.4*
You're already doing it!!	Any step by step process that takes place in your classroom is an excellent opportunity to talk about altorighms and what happens if one step is missed or miscommunicated? Clapping to get their attention! When I clap, you clap! This is an if/then command! Math problems need to be completed in a specific order Writing conventions (capital letters, periods) Following a set of directions to complete a task Sorting things in alpha order Discussing recipes Any repetitive task

Extensions	Create step by step instructions to complete a simple task Happy Maps - code.org unplugged Code.org Course A (this has a series of lessons that students can navigate. It includes videos and unplugged activities as well as coding!) Explain algorithms to kids (tynker.com) Paper Airplane activity (code.org) Plant a seed activity (code.org)

1.AP.V.1 Algorithms & Programming Variables	**Model the way programs store and manipulate data by using numbers or other symbols to represent information.** Information in the real world can be represented in computer programs. Students could use thumbs up/down as representations of yes/no, use arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words. *Practice(s): Developing and Using Abstractions: 4.3*
You're already doing it!!	Decoding words in language arts Following arrows in directions Colors to represent the noise level Hand signals to identify different actions they want to take (bathroom, drink, sharpen pencil, etc.) Hand signals to identify understanding - thumbs up/down, fist to five, etc.
Extensions	Happy Maps - code.org unplugged Binary Bracelets - code.org unplugged Navigate a maze using arrows - set a maze on the floor and hold up arrows for them to navigate The Big Event - code.org unplugged Use emojis to tell a story

1.AP.C.1 Algorithms & Programming Control	**Identify programs with sequences and simple loops, to express ideas or address a problem.** Programming is used as a tool to create products that reflect a wide range of interests. Control structures specify the order in which instructions are executed within a program. Computers follow instructions literally. Sequences are the order of instructions in a program. For example, sequences of instructions include steps for drawing a shape or moving a character across the screen. If the commands to program a robot are not in the correct order, the robot will not complete the task desired. Loops allow for the repetition of a sequence of code multiple times. For example, in a program to show the life cycle of a butterfly, a loop could be combined with move commands to allow continual but controlled movement of the character. For example, first grade students independently identify loops and sequences in songs, rhymes, and games, such as the song B-I-N-G-O or the game Red Light/Green Light. *Practice(s): Creating Computational Artifacts: 5.1*
You're already	Any time you tell students to "continue until…" it is a loop! (musical chairs!!)

doing it!!	Giving step by step instructions that must be done in order - sequences! Timelines in social studies Experiments in Science
Extensions	Code.org Course A (this has multiple activities that students can navigate) Happy Loops - code.org unplugged Have students give commands to navigate a maze

1.AP.M.1 Algorithms & Programming Modularity	**Solve a problem by breaking it down into smaller parts.** 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. *Practice(s): Recognizing and Defining Computational Problems: 3.1*
You're already doing it!!	Decoding words by sound Step by step instructions in anything Completing a jigsaw or any other type of puzzle
Extensions	Code.org Course A (this has multiple activities that students can navigate) Here's an explanation of modularity and CS (not necessarily for students - maybe too advanced but a way to wrap your own head around it!)

1.AP.PD.1 Algorithms & Programming Programming Development	**With teacher assistance identify plans that describe a program's sequence of events, goals, and expected outcomes**. Programming is used as a tool to create products that reflect a wide range of interests, such as video games, interactive art projects, and digital stories. Students could create a planning document, such as a story map, a storyboard, or a sequential graphic organizer, to illustrate what their end product will do. Students at this stage may complete the planning process with help from their teachers. For example, students create a comic strip with at least 3 panels showing the sequence of a story. *Practice(s): Creating Computational Artifacts, Communicating About Computing: 5.3, 7.1*
You're already doing it!!	Thinking maps Goal setting
Extensions	Programming in code.org with angry birds! Great computational thinking game that ties with Math!

1.AP.PD.2 Algorithms & Programming Programming Development	**With teacher assistance, give attribution (credit) when using the ideas and creations of others while developing programs.** Using computers comes with a level of responsibility. Students should 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 or orally, if sharing work on a class blog or website. Proper attribution at this stage does not require a formal citation, such as in a bibliography or works cited document. *Practice(s): Communicating About Computing: 7.3*
You're already doing it!!	Discussing the author of a book or a piece of art Students putting their name on their paper - gives THEM credit! Not stealing other people's work Having students identify where they got information (which book, website, person, etc.)
Extensions	Here's a good article about copyright and talking to kids about it. Citations for elementary (video and resources!)

1.AP.PD.3 Algorithms & Programming Programming Development	**With teacher assistance, debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.** Algorithms or programs may not always work correctly. Students should be able to 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. For example, first graders should be able to identify and fix incorrect order in a series of events, placing them in the correct order, such as washing dishes at home. When the steps repeat, a loop is created. *Practice(s): Testing and Refining Computational Artifacts: 6.3*
You're already doing it!!	Correcting work (math problems, language arts, etc.) / test corrections Alphabetize Numerical order
Extensions	Unspotted Bugs code.org unplugged Sequence game online!

1.AP.PD.4 Algorithms & Programming Programming Development	**Using correct terminology, describe steps taken and choices made during program development**. At this stage, students should be able to talk or write about the goals and expected outcomes of the instructions they develop and the choices that they made when developing their instructions. This could be done using coding journals, discussions with a teacher, class presentations, or classroom blogs. For example, first grade students do a class presentation sharing the process, choices they made, and outcomes for a fictitious product they developed. *Practice(s): Communicating About Computing:7.2*
You're already doing it!!	Solving and correcting math problems Asking "how did you come up with that answer?"

	Describing steps taken to complete a task
Extensions	Coding in Scratch Jr.

IMPACTS OF COMPUTING

1.IC.C.1 Impacts of Computing Culture	**Discuss how people live and work before and after the implementation or adoption of new computing technology.** Computing technology has positively and negatively changed the way people live and work. In the past, if students wanted to read about a topic, they needed access to a library to find a book about it. Today, students can view and read information on the Internet about a topic or they can download e-books about it directly to a device. Such information may be available in more than one language and could be read to a student, allowing for great accessibility. *Practice(s): Communicating About Computing: 7.1*
You're already doing it!!	History and social studies Changes in technology Current events
Extensions	Show examples of the evolution of different technology - phones, computers, cameras, etc. Discuss advantages and disadvantages of old and new technology Kids react to old computers video (7:41)

1.IC.SI.1 Impacts of Computing Social Interactions	**Work respectfully and responsibly with others online.** Online communication facilitates positive interactions, such as sharing ideas with many people, but the public and anonymous nature of online communication also allows intimidating and inappropriate behavior in the form of cyberbullying. Students could share their work on blogs or in other collaborative spaces online, taking care to avoid sharing information that is inappropriate or that could personally identify them to others. Students could provide feedback to others on their work in a kind and respectful manner. They should tell an adult if others are sharing things they should not share or are treating others in an unkind or disrespectful manner on online. Privacy should be considered when posting information online: such information can persist for a long time and be accessed by others, even unintended viewers. *Practice(s): Collaborating Around Computing: 2.1*
You're already doing it!!	Behavior expectations Anti-bullying discussions

Extensions	Know the Rule video (1:53) Use Your Netsmartz video (2:27) What is Personal Information (2:41)

1.IC.SLE.1 Impacts of Computing Safety, Law & Ethics	**Keep login information private, and log off devices appropriately.** Using computers comes with a level of responsibility, such as not sharing login information, keeping passwords private, and logging off when finished. Rules guiding personal interactions in the world, apply to online environments as well. For example, students routinely practice logging in and logging out of online resources to protect their personal information. Students should also commit to interacting with only those they know in person in online environments. *Practice(s): Communicating About Computing:7.2*
You're already doing it!!	Inform students that they need to log on and off to prevent others from using the computer under their log in. Because it saves files, etc. Reminding students the importance of keeping passwords private so others can't access your information online.
Extensions	Password rap video (2:00) NetSafe Tell an Adult video (2:02) Understanding Online "Friends" video (2:12)

TIPS and TRICKS

AZ CS Standards Full document

Computational Thinking for Educators course offered by Google! This is a free self paced offering by Google to introduce teachers to delivering computational thinking lessons to their students of all ages!

The core of Computer Science is really computational thinking! You do this with your students all day every day!! An excellent way of getting your students to think like computer scientists is to speak to them about how your everyday routines relate to computer science!

High School Standards are to be acquired throughout the 4 years of high school and all teachers are responsible for doing their part! Not all standards will fit into your curriculum but identify ways you may already be teaching them!

Notice that none of these standards refer to a specific program or app! They are written to develop computational thinkers! So, keep doing what you're doing but help them make the connections to computer science through your discussions!

USEFUL WEBSITES AND RESOURCES

Computer Science Principles - An entire course offered by Code.org for High School

1st Grade CS Lessons

Self Paced 30 hour Computer Science course offered by code.org for Middle and High school
Unplugged activities - several unplugged activities tied to general curriculum!
Internet Safety BrainPop video (3:46)
Internet Safety - Don't click on pop-ups video (1:51)
Keyboarding Practice on abcya.com
Links to many activities by grade level
Mouse skills practice
Mouse skills - Bees & Honey
Code.org Course A (this has multiple activities that students can navigate over multiple class periods)
Codeforfun - TONS of grade appropriate lesson plans and materials to use sorted by topic
Coding game for young students
Great game to play during recess! - teaches if/then/else
Another great get moving game! - treasure hunt using directions
Great short videos about Internet safety! - excellent videos for beginning of the day when doing attendance!
K-12 Digital Citizenship from Common Sense Media