Pacing Guide For Computer Science and Design Thinking Curriculum

Grade 3-5

Topic	Marking Period	Number of Days
Computing Systems	3	1
Networks and the Internet	3	1
Impacts of Computing	3	1
Data & Analysis	3 woven throughout others	3-4
Algorithms & Programming	3/4	6-8
Engineering Design	4	4
Interaction of Technology and Human	3,4	2
Nature of Technology	4	2
Effects of Technology on the Natural World	4	2
Ethics & Culture	1, 2, 3, 4	7

Written August 2022
Reapproved by Board Aug 2026

Alpha Public School
Computer Science and Design Thinking Curriculum Map

Grade: 3-5

Standard: 8.1.5	**Content Topic:** Computing Systems

Strand	Disciplinary Core Ideas / Essential Statement	Objective / Performance Expectation	Practice, Skills & Lesson
8.1.5.CS.1	Computing devices may be connected to other devices to form a system as a way to extend their capabilities	Model how computing devices connect to other components to form a system	GCFLearnFree.org Code.org ~ What is the internet?
8.1.5.CS.2	Software and hardware work together as a system to accomplish tasks (e.g., sending, receiving, processing, and storing units of information)	Model how computer software and hardware work together as a system to accomplish tasks	GCFLearnFree.org (Hardware vs. Software) video Code.org ~ Hardware & software
8.1.5.CS.3	Shared features allow for common troubleshooting strategies that can be effective for many systems	Identify potential solutions for simple hardware and software problems using common troubleshooting strategies	Computing Systems lesson plan

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
questions	Troubleshooting scenarios	Sci Kids youtube video GCFLearn PBS learning media: Martha Speaks (Virtually Martha)

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1) / Intercultural Statements
Code.org Videos	Science ELA

Differentiation (IEPs / 504s)	Differentiation (ELL)	Differentiation (G &T)
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21st Century Education	Career Education
THEMES: Global Awareness Financial, Economic, Business and Entrepreneurial Literacy Civic Literacy Health Literacy SKILLS: Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy ICT Literacy Life and Career Skills	Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP3. Attend to personal health and financial well-being. CRP4. Communicate clearly and effectively and with reason. CRP5. Consider the environmental, social and economic impacts of decisions. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership and effective management. CRP10. Plan education and career paths aligned to personal goals. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.

Standard: 8.1.5	**Content Topic:** Networks and the Internet

Strand	Disciplinary Core Ideas / Essential Statement	Objective / Performance Expectation	Practice, Skills & Lesson
8.1.5.NI.1	Information needs a physical or wireless path to travel to be sent and received	Develop models that successfully transmit and receive information using both wired and wireless methods	Code.org ~ What is the internet?
8.1.5.NI.1	Distinguishing between public and private information is important for safe and secure online interactions. Information can be protected using various security measures (ie, physical and digital)	Describe physical and digital security measures for protecting sensitive personal information	Common Sense Media: Private & Personal Information Password lesson

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Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
Question & Answer Venn diagram: Private vs Personal information Google Forms	Create a unique and strong password	Common Sense Education

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1) / Intercultural Statements
Youtube videos	Science ELA

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Standard: 8.1.5	**Content Topic:** Impacts of Computing

Strand	Disciplinary Core Ideas / Essential Statement	Objective / Performance Expectation	Practice, Skills & Lesson
8.1.5.IC.1	The development and modification of computing technology is driven by individual's needs and wants and can affect individuals differently	Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the change	Technology Time Line
8.1.5.IC.2	The development and modification of computing technology is driven by individual's needs and wants and can affect individuals differently	Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users	Technology Time Line

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
Question & Answer Chromebook Search: Identify Accessibility features	Technology Timeline	Code.org virtual field trips & careers Discovery Ed: tech benefits & harm

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1) / Intercultural Statements
Timeline Projects Research projects	ELA Science

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Standard: 8.1.5	**Content Topic:** Data and Analysis

Strand	Disciplinary Core Ideas / Essential Statement	Objective / Performance Expectation	Practice, Skills & Lesson
8.1.5.DA.1	Data can be organized, displayed, and presented to highlight relationships	Collect, organize, and display data in order to highlight relationships or support a claim	Code.org: course F, lesson 16 Simulating Experiments Data collection sheet
8.1.5.DA.2	The type of data being stored affects the storage requirements	Compare the amount of storage space required for different types of data	Weather Tracking (adjust years to adjust storage) Rutger's University
8.1.5.DA.3	Individuals can select, organize, and transform data into different visual representations and communicate insights gained from the data	Organize and present collected data visually to communicate insights gained from different views of the data	Code.org: course F, lesson 16 Simulating Experiments Data collection sheet
8.1.5.DA.4	Individuals can select, organize, and transform data into different visual representations and communicate insights gained from the data	Organize and present climate change data visually to highlight relationships or support a claim	Weather Tracking (adjust years to adjust storage) Rutgers University
8.1.5.DA.5	Many factors influence the accuracy of inferences and predictions	Propose cause and effect relationships, predict outcomes, or communicate ideas using data	Weather Tracking (adjust years to adjust storage) Rutgers University

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Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
Data collection sheets Q & A	Running Simulations Data Collection sheet & analysis	Code.org assorted lessons NJ State Climatologist: Rutgers University Vid Code

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1) / Intercultural Statements
Data collection Weather tracking Videos	ELA Science Math

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Standard: 8.1.5	**Content Topic:** Algorithms and Programming

Strand	Disciplinary Core Ideas / Essential Statement	Objective / Performance Expectation	Practice, Skills & Lesson
8.1.5.AP.1	Different algorithms can achieve the same result. Some algorithms are more appropriate for a specific use than others	Compare and refine multiple algorithms for the same task and determine which is the most appropriate	Code.org ~ Sprite Lab
8.1.5.AP.2	Programming language provides variables, which are used to store and modify data	Create programs that use clearly named variables to store and modify data	Code.org ~ Minecraft Hour of Code
8.1.5.AP.3	A variety of control structures are used to change the flow of program execution (e.g., sequences, events, loops, conditionals)	Create programs that include sequences, events, loops and conditionals	Various code.org activities Ozobots Dash & Dot robots
8.1.5.AP.4	Programs can be broken down into smaller parts to facilitate their design, implementation, and review. Programs can also be created by incorporating smaller portions of programs that already exist	Break down problems into smaller, manageable sub-problems to facilitate program development.	My Robotic Friend (unplugged activity)
8.1.5.AP.5	Programs can be broken down into smaller parts to facilitate their design, implementation, and review. Programs can also be created by incorporating smaller portions of programs that already exist	Modify, remix, or incorporate pieces of existing programs into one's own work to add additional features or create a new program	Dash & Dot robots Scratch programming
8.1.5.AP.6	Individuals develop programs using a iterative process involving design, implementation, testing and review	Develop programs using an iterative process, implement the program design, and test the program to ensure it works as intended.	Dash & Dot robots Scratch programming

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Q & A Vocabulary Code & record algorithm Peer assessment	Scratch: Animate your name	Code.org Scratch WonderWorkshop (Dash lessons)

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1) / Intercultural Statements
Ozobots	Science Math

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Standard: 8.2.5	**Content Topic:** Engineering Design

Strand	Disciplinary Core Ideas / Essential Statement	Objective / Performance Expectation	Practice, Skills & Lesson
8.2.5.ED.1	Engineering design is a systematic and creative process of communicating and collaborating to meet a design challenge. Often, several design solutions exist, each better in some way than the others.	Explain the functions of a system and its subsystem	Transportation=roads, highways, lanes, cul du sacs, trains, buses, cars, traffic lights, street signs.
8.2.5.ED.2	Engineering design is a systematic and creative process of communicating and collaborating to meet a design challenge. Often, several design solutions exist, each better in some way than the others.	Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.	3rd Grade: Trash to Treasure Recycling Design 3D design with TinkerCAD
8.2.5.ED.3	Engineering design is a systematic and creative process of collaborating to meet a design challenge. Often, several design solutions exist, each better in some ways than others.	Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish this task.	My Robotic Friend Tangrams
8.2.5.ED.4	Engineering design requirements include desired features and limitations that need to be considered	Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints)	Passport STEM- building activities
8.2.5.ED.5	Engineering design requirements include desired features and limitations that need to be considered	Describe how specifications and limitations impact the engineering design process	Passport STEM- building activities
8.2.5.ED.6	Engineering design requirements include desired features and limitations that need to be considered	Evaluate and test alternative solutions to a problem using the constraints and tradeoffs identified in the design process	Passport STEM- building activities

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Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
Q & A EDP journals STEM rubric	Trash to Treasure Advertisement	Passport STEM collection Code.org Crash Course videos

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1) / Intercultural Statements
Code.org TinkerCAD	Science, Ecology Social Studies

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Standard: 8.2.5	**Content Topic:** Interaction of Technology and Humans

Strand	Disciplinary Core Ideas / Essential Statement	Objective / Performance Expectation	Practice, Skills & Lesson
8.2.5.ITH.1	Societal needs and wants determine which new tools are developed to address real-world problems	Explain how societal needs and wants influence the development and function of a product and a system	Bloxels game design 3rd Grade: Trash to Treasure Recycling Design
8.2.5.ITH.2	A new tool may have favorable or unfavorable results as well as both positive and negative effects on society. Technology spurs new business and careers	Evaluate how well a new tool has met its intended purpose and identify any shortcomings it may have	Playground Design for Disabilities
8.2.5.ITH.3	A new tool may have favorable or unfavorable results as well as both positive and negative effects on society. Technology spurs new business and careers	Analyze the effectiveness of a new product or system and identify the positive and / or negative consequences resulting from its use.	Telephone vs Cell Phone
8.2.5.ITH.4	A new tool may have favorable or unfavorable results as well as both positive and negative effects on society. Technology spurs new business and careers	Describe a technology / tool that has made the way people live easier or has led to a new business or career	ScienceBuddies.org: Career Bingo

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
Venn Diagrams EDP journals	Game design Playground diagram & reflection	Science Buddies Bloxels

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1) / Intercultural Statements
Bloxels	Science

Differentiation (IEPs / 504s)	Differentiation (ELL)	Differentiation (G &T)
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Standard: 8.2.5.NT.1	**Content Topic:** Nature of Technology

Strand	Disciplinary Core Ideas / Essential Statement	Objective / Performance Expectation	Practice, Skills & Lesson
8.2.5.NT.1	Technology innovation and improvement may be influenced by a variety of factors. Engineers create and modify technologies to meet people's needs and wants; scientists ask question about the natural world	Troubleshoot a product that has stopped working and brainstorm ideas to correct the problem	Toy Take Aparts

8.2.5.NT.2	Technology innovation and improvement may be influenced by a variety of factors. Engineers create and modify technologies to meet people's needs and wants; scientists ask question about the natural world	Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries, and societies	*Sophia Valdez Future Prez* Read Aloud, then Playground Design for Disabilities
8.2.5.NT.3	Technology innovation and improvement may be influenced by a variety of factors. Engineers create and modify technologies to meet people's needs and wants; scientists ask question about the natural world	Redesign an existing product for a different purpose in a collaborative team	Playground Design for Disabilities
8.2.5.NT.4	Technology innovation and improvement may be influenced by a variety of factors. Engineers create and modify technologies to meet people's needs and wants; scientists ask question about the natural world	Identify how improvement in the understanding of materials science impacts technologies	3rd Grade: Trash to Treasure Recycling Design

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
EDP journals Q & A	Playground design & reflection Recycling advertisement	*Sophia Valdez Future Prez* by Andrea Beaty Trash to treasure Slides

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1) / Intercultural Statements
Toytheater.com Scratch	ELA Science

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Standard: 8.2.5.	**Content Topic:** Effects of Technology on the Natural World

Strand	Disciplinary Core Ideas / Essential Statement	Objective / Performance Expectation	Practice, Skills & Lesson
8.2.5.ETW.1	The technology developed for the human designed world can have unintended consequences for the environment. Technology must be continually developed and made more efficient to reduce the need for non-renewable resources	Describe how resources such as material, energy, information, time, tools, people and capital are used in products or systems.	*Sophia Valdez Future Prez* Read Aloud, then Playground Design for Disabilities Every Drop Counts
8.2.5.ETW.2	The technology developed for the human designed world can have unintended consequences for the environment. Technology must be continually developed and made more efficient to reduce the need for non-renewable resources	Describe ways that various technologies are used to reduce improper use of resources	3rd Grade: Trash to Treasure Recycling Design
8.2.5.ETW.3	The technology developed for the human designed world can have unintended consequences for the environment. Technology must be continually developed and made more efficient to reduce the need for non-renewable resources	Explain why human-designed systems, products, and environments need to be constantly monitored, maintained and improved	Earth Day: flip book Every Drop Counts One Plastic Bag

8.2.5.ETW.4	the technology developed for the human designed world can have unintended consequences for the environment. Technology must be continually developed and made more efficient to reduce the need for non-renewable resources	Explain the impact that resources, such as energy and materials used to develop technology, have on the environment	Earth Day: flip book One Plastic Bag
8.2.5.ETW.5	the technology developed for the human designed world can have unintended consequences for the environment. Technology must be continually developed and made more efficient to reduce the need for non-renewable resources	Identify the impact of a specific technology on the environment and determine what can be done to increase positive effects and to reduce any negative effects, such as climate change	3rd Grade: Trash to Treasure Recycling Design

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
EDP journal Q & A	Trash to treasure advertisement Final playground design & reflection	UN Global Goals-lessons Every Drop Counts Trash to Treasure Slides

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1) / Intercultural Statements
Flipgird / Flip book	Science

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Standard: 8.2.5	**Content Topic:** Ethics and Culture

Strand	Disciplinary Core Ideas / Essential Statement	Objective / Performance Expectation	Practice, Skills & Lesson
8.2.5.EC.1	Technological choices and opportunities vary due to factors such as differences in economic resources, location and cultural values	Analyze how technology has contributed to or reduced inequities in local and global communities and determine its short and long term effects	Will Robots Take Away Jobs? One Plastic Bag

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
Q & A Discussion	Plastic Possibilities: create something from a plastic bag.	*One Plastic Bag* eBook: *How to Train Your Robot*

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1) / Intercultural Statements
Youtube video Chromebooks	Science Social Studies ELA

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-Modify work as needed -teacher will read aloud questions -allow more time if needed, preferential seating	-Modify work as needed -teacher will read aloud questions -allow more time if needed, preferential seating -Provide challenge activities for enrichment	-Provide additional work as needed -Provide challenge activities for enrichment

21st Century Education	Career Education
<u>THEMES:</u> Global Awareness Financial, Economic, Business and Entrepreneurial Literacy Civic Literacy Health Literacy <u>SKILLS:</u> Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy ICT Literacy Life and Career Skills	Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP3. Attend to personal health and financial well-being. CRP4. Communicate clearly and effectively and with reason. CRP5. Consider the environmental, social and economic impacts of decisions. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership and effective management. CRP10. Plan education and career paths aligned to personal goals. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.