Wisconsin Computer Science

Grades 6–8

Students will recognize and define computational problems using algorithms and programming AP1

A Develop algorithms. AP1.A

6 Decompose (break down) a computational problem into parts and create solutions for one or more parts. AP1.A.6.M

7 Identify how sub-problems could be recombined to create something new (e.g., break down the individual parts that would be needed to program a certain type of game and then show how the parts could be reused in other types of games). AP1.A.7.M

Students will create computational artifacts using algorithms and programming AP2

A Develop and implement an artifact. AP2.A

6 Develop programs, both independently and collaboratively, which include sequencing with nested loops and multiple branches [Clarification At this level, students may use block-based and/or text-based languages]. AP2.A.6.M

7 Produce computational artifacts with broad accessibility and usability through careful consideration of diverse needs and wants of the community. AP2.A.7.M

12 Design, develop, and implement a computing artifact that responds to an event (e.g., robot that responds to a sensor, mobile app that responds to a text message, sprite that responds to a broadcast). AP2.A.12.H

9 Create variables that represent different types of data and manipulate their values. AP2.A.9.M

Students will communicate about computing ideas AP3

A Recognize and cite sources. AP3.A

3 Provide proper attribution when code is borrowed or built upon. AP3.A.3.M

B Communicate about technical and social issues. AP3.B

5 Discuss how algorithms have impacted society—both the beneficial and harmful effects. AP3.B.5.M

6 Compare different algorithms that may be used to solve the same problem in terms of their speed, clarity, and size (e.g., different algorithms solve the same problem, but one might be faster than the other). [Clarification Students are not expected to quantify these differences]. AP3.B.6.M

7 Modify existing code to change its functionality and discuss the variety of ways in which to do this. AP3.B.7.M

Document code. AP3.C

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1 Interpret the flow of execution of algorithms and predict their outcomes. [Clarification Algorithms can be expressed using natural language, flow and control diagrams, comments within code, and pseudocode]. AP3.C.1.M

2 Use documentation regarding code to modify programs. AP3.C.2.M

Students will develop and use abstractions AP4

A Create and use abstractions (representations) to solve complex computational problems. AP4.A

3 Define and use functions/procedures that hide the complexity of a task and can be reused to solve similar tasks. [Clarification Students use and modify, but do not necessarily create, functions or procedures with parameters]. AP4.A.3.M

Students will collaborate with diverse teams AP5

A Work together to solve computational problems using a variety of resources. AP5.A

5 Solicit and integrate peer feedback as appropriate to develop or refine a program. AP5.A.5.M

B Foster an inclusive computing culture. AP5.B

2 Analyze team members' strengths and use them to foster an inclusive computing culture. AP5.B.2.M

Students will test and refine computational solutions AP6

A Test and debug computational solutions. AP6.A

3 Use testing and debugging methods to ensure program correctness and completeness. AP6.A.3.M

B Develop and apply success criteria. AP6.B

2 Apply a rubric to determine if and how well a program meets objectives. AP6.B.2.M

Students will communicate about computing systems CS1

A Identify hardware and software components. CS1.A

5 Justify the suitability of hardware and software chosen to accomplish a task (e.g., comparison of the features of a tablet vs. desktop, selecting which sensors and platform to use in building a robot or developing a mobile app). CS1.A.5.M

Students will test and refine computing systems CS2

A Problem solve and debug. CS2.A

3 Use a systematic process to identify the source of a problem within individual and connected devices (e.g., follow a troubleshooting flow diagram, make changes to software to see if hardware will work, restart device, check connections, swap in working components). CS2.A.3.M

Students will develop and use abstractions in computing systems CS3

A Generalize in computer systems. CS3.A

1 Analyze the relationship between a device's computational components and its capabilities. (e.g., computing systems include not only computers, but also cars, microwaves, smartphones, traffic lights, and flash drives). CS3.A.1.M

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Students will create and modify computing systems CS4

A Modify and create computational artifacts. CS4.A

1 Extend or modify existing programs to add simple features and behaviors using different forms of inputs and outputs (e.g., inputs such as sensors, mouse clicks, data sets; outputs such as text, graphics, sounds). CS4.A.1.M

Students will create computational artifacts using data and analysis DA1

A Represent and manipulate data. DA1.A

3 Represent data using different encoding schemes (e.g., binary, Unicode, Morse code, shorthand, student-created codes). DA1.A.3.M

Students will recognize and define data in computational problems DA2

A Gather data to support computational problem solving. DA2.A

3 Gather and organize multiple quantitative data elements using a computational tool (e.g., spreadsheet software). DA2.A.3.M

B Categorize and analyze data. DA2.B

3 Develop a strategy to answer a question by using a computer to manipulate (e.g., sort, total and/or average, chart, graph) and analyze data that has been collected by the class or student. DA2.B.3.M

Students will communicate about data in computing DA3

A Communicate about data. DA3.A

4 Describe how different formats of stored data represent tradeoffs between quality and size. [Clarification compare examples of music, text and/or image formats]. DA3.A.4.M

5 Explain the processes used to collect, transform, and analyze data to solve a problem using computational tools (e.g., use an app or spreadsheet form to collect data, decide which data to use or ignore, and choose a visualization method). DA3.A.5.M

Students will develop and use data abstractions DA4

A Model with data. DA4.A

4 Revise computational models to more accurately reflect real-world systems (e.g., ecosystems, epidemics, spread of ideas). DA4.A.4.M

5 Modify an existing computational model to emphasize key features and relationships within a system. (A model can be used to simulate events, examine theories and inferences, or make predictions). DA4.A.5.M

Students will understand the impact and effect computing technology has on our everyday lives IC1

A Understand the impact technology has on our everyday lives and the effects of computing on the economy and culture. IC1.A

4 Provide examples of how computational artifacts and devices impact health and wellbeing, both positively and negatively, locally and globally (e.g., effects of globalization, and automation). IC1.A.4.M

5 Explain how computer science fosters innovation and can enhance careers and disciplines. IC1.A.5.M

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B Understand the effects of computing on communication and relationships. IC1.B

3 Analyze and present beneficial and harmful effects of personal electronic communication and social electronic communication. IC1.B.3.M

4 Describe ways in which the internet impacts global communication and collaborating. IC1.B.4.M

Students will experience learning within a collaborative, inclusive computing culture and explain the steps needed to ensure that all people have access to computing IC2

A Understand the effects of the digital divide. IC2.A

2 Explain the impact of the digital divide (i.e., uneven access to computing, computing education, and interfaces) on access to critical information. IC2.A.2.M

B Test and refine digital artifacts for accessibility. IC2.B

2 Critically evaluate and redesign a computational artifact to remove barriers to universal access (e.g., using captions on images, high contrast colors, and/or larger font sizes). IC2.B.2.M

C Collaborate ethically in the creation of digital artifacts. IC2.C

4 Use the internet ethically and safely to work with a group of people who are not physically near to solve a problem or reach a goal. IC2.C.4.M

Students will understand the importance of proper use of data and information in a computing society IC3

A Understand intellectual property and fair use. IC3.A

2 Understand laws associated with digital information (e.g., intellectual property, fair use, and Creative Commons). IC3.A.2.M

3 Describe ethical issues that relate to computing devices and networks (e.g., equity of access, security, hacking, intellectual property, copyright, Creative Commons licensing, and plagiarism). IC3.A.3.M

B Assess the practice of digital privacy. IC3.B

4 Analyze and summarize negative and positive impacts of using data and information to categorize people, predict behavior, and make recommendations based on those predictions (e.g., customizing search results or targeted advertising based on previous browsing history can save search time and limit options at the same time). IC3.B.4.M

Students will understand the importance of security when using technology NI1

A Use secure practices for personal computing. NI1.A

4 Analyze and summarize security risks associated with weak passwords, lack of encryption, insecure transactions, and persistence of data. NI1.A.4.M

5 Understand security issues with general computer use. NI1.A.5.M

B Understand the importance of institutional security. NI1.B

2 Explain the principles of information security (confidentiality, integrity, availability) and authentication techniques. NI1.B.2.M

Stu un Skip to main content **)emonstrate how the internet works at the physical layer.** NI2.A

information is sent by the internet NI2

6 Simulate how information is transmitted as packets through multiple devices over the internet and networks. NI2.A.6.M

7 Explain, using basic terms, how a wireless or cellular network allows internet information to be transmitted from a server to a user device. NI2.A.7.M

B Demonstrate how the internet works at the protocol layer. NI2.B

2 Define the term protocol, provide an example of protocols in daily life, and explain their use on the internet. NI2.B.2.M

C Demonstrate how the internet works at the addressing layer. NI2.C

3 Explain the hierarchical structure of the Internet Domain Name System (IDNS). NI2.C.3.M

D Demonstrate and explain encryption methods. NI2.D

2 Encode and decode text-based messages using basic algorithms (e.g., shift cipher, substitution cipher). NI2.D.2.M