Virginia Computer Science

Grade 4

Adopted 2017

Algorithms and Programming

1. **The student will construct sets of step-by-step instructions (algorithms) both independently and collaboratively** 4.1
   a. using sequencing; 4.1.A
   b. using loops; 4.1.B
   c. using variables to store and process data; and 4.1.C
   d. performing number calculations on variables (e.g., addition, subtraction, multiplication and division). [Related SOL: Math 4.4, 4.5, 4.6] 4.1.D

2. **The student will construct programs to accomplish a task as a means of creative expression using a block or text based programming language, both independently and collaboratively** 4.2
   a. using sequencing; 4.2.A
   b. using loops; 4.2.B
   c. using variables; and 4.2.C
   d. performing number calculations (e.g., addition, subtraction, multiplication and division) on variables. [Related SOL: Math 4.4, 4.5, 4.6] 4.2.D

3. **The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, loops and variables. [Related SOL areas – Math: Problem Solving, English: Editing]** 4.3

4. **The student will create a plan as part of the iterative design process, both independently and collaboratively using strategies such as pair programming (e.g., storyboard, flowchart, pseudo-code, story map). [Related SOL: English: 4.7d, f]** 4.4

5. **The student will classify and arrange a group of items based on the attributes or actions. [Related SOL: Science 4.1.b]** 4.5

6. **The student will break down (decompose) a larger problem into smaller sub-problems, both independently and collaboratively. [Related SOL: Math 4.4d]** 4.6

7. **The student will give credit to sources when borrowing or changing ideas (e.g., using information, pictures created by others, using music created by others, remixing programming projects).** 4.7

Computing Systems	**8. The student will model how a computing system works including input and output, processors and sensors.** 4.8
	9. The student will identify, using accurate terminology, simple hardware and software problems that may occur during use, and apply strategies for solving problems (e.g., rebooting the device, checking for power, checking for network availability, closing and reopening an app). 4.9
Cybersecurity	**10. The student will identify and explain problems that relate to inappropriate use of computing devices and networks.** 4.10
	11. The student will create examples of strong passwords, explain why strong passwords should be used, and demonstrate proper use and protection of personal passwords. 4.11
Data and Analysis	**12. The student will answer questions by using a computer to manipulate data in order for the student to draw conclusions and make predictions.** 4.12
	13. The student will create an artifact using computing systems to model the attributes and behaviors associated with a concept (e.g., solar system). 4.13
	14. The student will use numeric values to represent non-numeric ideas in the computer (binary, ASCII, pixel attributes such as RGB). 4.14
Impacts of Computing	**15. The student will give examples of computing technologies that have changed the world and express how those technologies influence, and are influenced by, cultural practices.** 4.15
	16. The student will describe the positive and negative impacts of the pervasiveness of computers and computing in daily life (e.g., downloading videos and audio files, electronic appliances, wireless Internet, mobile computing devices, GPS systems, wearable computing). 4.16
	17. The student will describe social and ethical issues that relate to computing devices and networks. 4.17
Networking and the Internet	**18. The student will identify and explain how information can be transmitted using computing devices via a network (e.g., email, images, and videos).** 4.18