



Scratch					Jeroo					CS Con		Java								
0	1	2	3	4	0	1	2	3	4	DC	TA	0	1	2	3	4	5	6	7	8

(2) **Communication and collaboration.** The student communicates and collaborates with peers to contribute to his or her own learning and the learning of others.

- 2 A create and properly display meaningful output.
- 2 B create interactive console display interfaces, with appropriate user prompts, to acquire data from a user.
- 2 C use Graphical User Interfaces (GUIs) to create interactive interfaces to acquire data from a user and display program results.
- 2 D write programs with proper programming style to enhance the readability and functionality of the code by using meaningful descriptive identifiers, internal comments, white space, spacing, indentation, and a standardized program style.
- 2 E improve numeric display by optimizing data visualization.
- 2 F display simple vector graphics using lines, circles, and rectangles.
- 2 G display simple bitmap images.
- 2 H seek and respond to advice from peers and professionals in evaluating quality and accuracy.

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(3) **Research and information fluency.** The student locates, analyzes, processes, and organizes data.

- 3 A use a variety of resources, including foundation and enrichment curricula, to gather authentic data as a basis for individual and group programming projects.
- 3 B use various productivity tools (applications) to gather authentic data as a basis for individual and group programming projects.

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(4) **Critical thinking, problem solving, and decision making.** The student uses appropriate strategies to analyze problems and design algorithms.

- 4 A use program design problem-solving strategies to create program solutions.
- 4 B define and specify the purpose and goals of solving a problem.
- 4 C identify the subtasks needed to solve a problem.
- 4 D identify the data types and objects needed to solve a problem.
- 4 E identify reusable components from existing code.
- 4 F design a solution to a problem.
- 4 G code a solution from a program design.
- 4 H identify and debug errors.
- 4 I test program solutions with appropriate valid and invalid test data for correctness.
- 4 J debug and solve problems using error messages, reference materials, language documentation, and effective strategies.

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Crosswalk: CS1 ↔ WeTeach_CS for HS - Page 3

- 4 K explore common algorithms, including finding greatest common divisor, finding the biggest number out of three, finding primes, making change, and finding the average.
- 4 L analyze and modify existing code to improve the underlying algorithm.
- 4 M create program solutions that exhibit robust behavior by understanding, avoiding, and preventing runtime errors, including division by zero and type mismatch.
- 4 N select the most appropriate algorithm for a defined problem.
- 4 O demonstrate proficiency in the use of the arithmetic operators to create mathematical expressions, including addition, subtraction, multiplication, real division, integer division, and modulus division.
- 4 P create program solutions to problems using available mathematics libraries, including absolute value, round, power, square, and square root.
- 4 Q develop program solutions that use assignment.
- 4 R develop sequential algorithms to solve non-branching and non-iterative problems.
- 4 S develop algorithms to decision-making problems using branching control statements.
- 4 T develop iterative algorithms and code programs to solve practical problems.
- 4 U demonstrate proficiency in the use of the relational operators.
- 4 V demonstrate proficiency in the use of the logical operators.
- 4 W generate and use random numbers.

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(5) **Digital citizenship.** The student explores and understands safety, legal, cultural, and societal issues relating to the use of technology and information.

- 5 A discuss intellectual property, privacy, sharing of information, copyright laws, and software licensing agreements.
- 5 B model ethical acquisition and use of digital information.
- 5 C demonstrate proper digital etiquette, responsible use of software, and knowledge of acceptable use policies.
- 5 D investigate measures, including passwords and virus detection/prevention, to protect computer systems and databases from unauthorized use and tampering.
- 5 E investigate how technology has changed and the social and ethical ramifications of computer usage.

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(6) **Technology operations, systems, and concepts.** The student understands technology concepts, systems, and operations as they apply to computer science.

- 6 A compare and contrast types of operating systems, software applications, and programming languages.
- 6 B demonstrate knowledge of major hardware components, including primary and secondary memory, a central processing unit (CPU), and
- 6 C differentiate among current programming languages, discuss the use of those languages in other fields of study, and demonstrate knowledge of specific programming terminology and concepts.
- 6 D differentiate between a high-level compiled language and an interpreted language.
- 6 E understand concepts of object-oriented design.
- 6 F use local and global scope access variable declarations.
- 6 G encapsulate data and associated subroutines into an abstract data type.
- 6 H create subroutines that do not return values with and without the use of arguments and parameters.
- 6 I create subroutines that return typed values with and without the use of arguments and parameters.
- 6 J understand and identify the data-binding process between arguments and parameters.
- 6 K compare objects using reference values and a comparison routine.
- 6 L understand the binary representation of numeric and nonnumeric data in computer systems.
- 6 M understand the finite limits of numeric data.
- 6 N perform numerical conversions between the decimal and binary number systems and count in the binary number system.
- 6 O choose, identify, and use the appropriate data types for integer, real, and Boolean data when writing program solutions.
- 6 P demonstrate an understanding of the concept of a variable.
- 6 Q demonstrate an understanding of and use reference variables for objects.
- 6 R demonstrate an understanding of how to represent and manipulate text data, including concatenation and other string functions.
- 6 S demonstrate an understanding of the concept of scope.
- 6 T identify and use the structured data type of one-dimensional arrays to traverse, search, and modify data.
- 6 U choose, identify, and use the appropriate data type and structure to properly represent the data in a program problem solution.
- 6 V compare and contrast strongly typed and un-typed programming languages.

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