

ARIZONA CTE CAREER PREPARATION STANDARDS & MEASUREMENT CRITERIA

SOFTWARE DEVELOPMENT, 15.1200.4	
STANDARD 1.0 – APPLY PROBLEM-SOLVING AND CRITICAL THINKING SKILLS TO INFORMATION TECHNOLOGY	
1.1	Describe methods of establishing priorities
1.2	Prepare a plan of work and schedule information technology tasks
1.3	Use problem-solving processes
1.4	Explain the purpose, types, and content of documentation
STANDARD 2.0 – MAINTAIN A SAFE GREEN INFORMATION TECHNOLOGY WORK ENVIRONMENT	
2.1	Demonstrate personal responsibility for developing and maintaining a safe and healthy information technology work environment
2.2	Use tools, materials, and equipment commonly used in the field of information technology safely
2.3	Identify ergonomics and repetitive strain injuries experienced in information technology occupations
2.4	Determine safe working practices to avoid or eliminate physical and electrical hazards
2.5	Describe techniques to reduce power consumption in the computer environment
2.6	Identify methods for making the computer environment more environmentally friendly
2.7	Explain environmental considerations when disposing of computer/networking components
STANDARD 3.0 – RECOGNIZE SECURITY ISSUES RELATED TO INFORMATION TECHNOLOGY	
3.1	Explain procedures to maintain data integrity and security
3.2	Identify security issues related to the network, computer hardware, software, and data
3.3	Describe computer threats and methods to protect a computer, i.e., viruses, phishing, e-mail, social engineering, spoofing, identify theft, and spamming
3.4	Explain concepts such as denial of service, hacking/cracking, intrusion, detection, and prevention
STANDARD 4.0 – EXPLORE LEGAL AND ETHICAL ISSUES RELATED TO INFORMATION TECHNOLOGY	
4.1	Explore intellectual property rights including software licensing and software duplication
4.2	Understand the legal and ethical issues related to the difference between open source and proprietary systems
4.3	Identify issues and trends affecting computers and information privacy
4.4	Differentiate between ethical and legal uses of information technology, i.e., data pricing, use of public and private networks, social networking, industry-related data, and data piracy

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STANDARD 5.0 – DEMONSTRATE BASIC COMPUTER MATHEMATICS REQUIRED FOR INFORMATION TECHNOLOGY	
5.1	Relate the function of general mathematics to computer hardware
5.2	Perform binary to decimal, decimal to hexadecimal, hexadecimal to decimal, binary to hexadecimal, and binary to hexadecimal conversions as needed to solve problems with hardware and software
STANDARD 6.0 – DESCRIBE THE DEVELOPMENT/EVOLUTION OF COMPUTERS AND INFORMATION TECHNOLOGY	
6.1	Describe a computer, its components and functions
6.2	Explain the historical evolution of the computer and computer networks
6.3	Explain how the development of computers has impacted modern life
6.4	Discuss future trends in information technology
STANDARD 7.0 – DEMONSTRATE PROGRAM ANALYSIS AND DESIGN	
7.1	List the steps in a program development cycle
7.2	Interpret a problem statement and identify program requirements
7.3	Apply pseudo code or a graphical representation to show the structure of a program or module
7.4	Determine input and output
7.5	Choose appropriate data structures
7.6	Apply stepwise refinement to improve design
7.7	Develop a testing plan
7.8	Choose appropriate documentation for a module
7.9	Use essential object analysis and design concepts
STANDARD 8.0 – CREATE A PROGRAM USING SOFTWARE	
8.1	Use a program editor to enter and modify code
8.2	Compile and execute programs
8.3	Follow established documentation standards
8.4	Name identifiers and formatting code by applying recognized conventions
8.5	Access program and language documentation

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STANDARD 9.0 – TEST AND DEBUG TO VERIFY PROGRAM OPERATION	
9.1	Identify errors in program modules
9.2	Identify boundary cases and generate appropriate test data
9.3	Perform integration testing including tests within a program to protect execution from bad input or other run-time errors
9.4	Categorize, identify, and correct errors in code, including syntax, logic, and run-time.
9.5	Hand trace code
STANDARD 10.0 – WRITE CODE TO PERFORM ARITHMETIC CALCULATIONS	
10.1	Identify and correctly use arithmetic operations applying the order of operations with respect to programming
10.2	Interpret and construct mathematical formulas
STANDARD 11.0 – EMPLOY MODULARITY IN WRITING PROGRAMS	
11.1	Access standard library functions
11.2	Demonstrate the use of parameters to pass data into program modules
11.3	Demonstrate the use of return values from modules
STANDARD 12.0 – UTILIZE CONDITIONAL STRUCTURES IN WRITING PROGRAMS	
12.1	Compare values using relational operators, i.e., =, >, <, >=, <=, and not equal
12.2	Evaluate Boolean expressions
12.3	Select an appropriate decision structure for a given situation
12.4	Select correct syntax for decision statements, i.e., if/else, if, and switch case
12.5	Select the correct nesting syntax for decision structures
STANDARD 13.0 – UTILIZE REPETITIVE STRUCTURES IN WRITING PROGRAMS	
13.1	Identify various types of repetition structures
13.2	Identify the role of a loop control variable
13.3	Select the correct syntax for nested loops
13.4	Compute the values of variables involved with nested loops

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STANDARD 14.0 – UTILIZE SIMPLE DATA TYPES AND STRINGS	
14.1	Declare numeric, Boolean, character, and string variables
14.2	Choose the appropriate data type for a given situation
14.3	Identify the correct syntax for constants in a program
14.4	Identify the correct syntax for initializing and modifying variables
14.5	Identify the correct syntax for operations on strings, including length, substring, and concatenation
STANDARD 15.0 – IMPLEMENT ARRAYS IN PROGRAMS	
15.1	Identify the correct syntax for declaring and initializing arrays of simple data types
15.2	Identify the correct syntax for declaring and initializing user-defined data types
15.3	Access elements within an array
15.4	Manipulate data stored in an array
15.5	Search and sort data in an array
15.6	Identify correct syntax for defining and using two-dimensional arrays
STANDARD 16.0 – IDENTIFY WAYS TO INPUT AND OUTPUT INFORMATION	
16.1	Identify appropriate methods to input data on a console and/or GUI
16.2	Identify correct input/output statements in a program
16.3	Choose the correct method of assigning input to variables
16.4	Choose the correct method of outputting text with formatting
16.5	Employ graphics methods to create images at specified locations
16.6	Choose correct GUI objects for input and output of data to the GUI interface, i.e., text boxes, labels, radio buttons, check boxes, dropdowns, and list boxes
STANDARD 17.0 – USE EXTERNAL DATA SOURCES WITHIN A PROGRAM	
17.1	Input data from a sequential file and database
17.2	Output data to a sequential file and/or database
17.3	Add data to an existing file
17.4	Update files and/or databases

These technical knowledge and skill standards were validated by a Skill Standards Validation Committee on April 30, 2009, and used in the adaptation, adoption, and development of test items for first time testing in Spring 2010.

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STANDARD 18.0 – EMPLOY OBJECT-ORIENTED PROGRAMMING TECHNIQUES	
18.1	Make a distinction between an object and a class
18.2	Distinguish between is-a, has-a, and class relationships
18.3	Exemplify objects from existing classes
18.4	Identify appropriate statements to invoke an object's accessor methods
18.5	Change the state of an object by invoking a modifier method
18.6	Determine the requirements for constructing new objects by reading the API
18.7	Identify the correct syntax for an original user-defined class
18.8	Identify the correct syntax for a class that extends an existing class
STANDARD 19.0 – APPLY KNOWLEDGE OF CODE TO PERFORM RUN-TIME ERROR-HANDLING	
19.1	Identify (catch) run-time errors and take appropriate action
19.2	Identify the proper syntax for user-created errors (throw errors)