

COMPUTER PROGRAMMING BLUEPRINT

This Blueprint contains the subject matter content of this Skill Connect Assessment. This Blueprint does **NOT** contain the information one would need to fully prepare for a SkillsUSA Championships contest. Please refer to the *SkillsUSA Championships Technical Standards* CD-ROM for the current year or purchase and download the relevant "Contest Singles." Both are available through www.skillsusa.org > Shop > Educational Materials Catalog.

Standards and Competencies

Demonstrate knowledge of computer programming

- Describe how programs and programming languages work
- Describe the purposes and practices of structured programming
- Demonstrate knowledge of object-oriented programming
- Explain the structured programming paradigm

Perform competencies related to Java programming

- Identify the primary components of a Java program
- Explain the basic syntax of a Java program
- Demonstrate ability to compile, debug and test the logic of a Java application
- Demonstrate use of Java's online hypertext technology documentation
- Demonstrate use of Java's identifiers to name variables, constants, and methods
- Demonstrate use of Java's operators to write expressions
- Explain the rules governing operand evaluation order and operator precedence
- Demonstrate ability to write code that conforms to Java's variable naming conventions
- Distinguish syntax errors, runtime errors and logic errors
- Understand program flow control in selection and loop statements
- Demonstrate use of methods and properties in Java
- Demonstrate use of declaring, initializing and accessing elements in arrays
- Demonstrate use of the string class to process fixed strings

Perform competencies related to C++ programming

- Identify correct input/output statements in C++ programs
- Identify proper use of selection and iteration in C++ programming
- Demonstrate use of functions in C++ programming
- Demonstrate use of one-dimensional arrays in C++ programming
- Properly document and debug C++ programs
- Create object concepts and terminology
- Implement algorithms using standard C++ classes
- Debug C++ programs written by others
- Use pointers in C++ programs
- Use databases in C++ programs

Perform competencies related to Visual Basic.NET programming

- Demonstrate knowledge of the fundamentals of Visual Basic.NET programming
- Use databases in Visual Basic.NET programs
- Use advanced controls and multiple controls in a business application
- Use record set controls in a business application
- Demonstrate knowledge of object-oriented programming techniques through the process of subprograms, selection, and repetition in projects
- Use GUI design principles in all projects

Committee Identified Academic Skills

The SkillsUSA national technical committee has identified that the following academic skills are embedded in the computer programming training program and assessment:

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Use scientific notation
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make predictions using knowledge of probability
- Make comparisons, predictions, and inferences using graphs and charts
- Organize and describe data using matrixes
- Graph linear equations
- Solve problems using proportions, formulas, and functions
- Find slope of a line
- Use laws of exponents to perform operations
- Solve quadratic equations
- Solve problems involving symmetry and transformation

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate comprehension of a variety of informational texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. To view high school standards, visit: standards.nctm.org/document/chapter7/index.htm. Select “Standards” from menu.

Science Standards

- Understands the sources and properties of energy
- Understands forces and motion

- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www.mcrel.org/standards-benchmarks/.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.readwritethink.org/standards/index.html.