COMPUTER PROGRAMMING

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of computer programming.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with computer programming as the occupational objective.

CLOTHING REQUIREMENTS

Class E: Contest specific — Business Casual

- Official SkillsUSA white polo shirt.
- Black dress slacks (accompanied by black dress socks or black or skin-tone seamless hose) or black dress skirt (knee-length, accompanied by black or skin-tone seamless hose).
- Black leather closed-toe dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 1-888-501-2183.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. Printer
   b. Programming instructions
   c. Timing and judges procedures
2. Supplied by the contestant:
   a. Desktop computer/monitor or laptop
   b. Visual Basic, Java, C++ or RPG software
   c. One copy only of the coding reference manual of the language in which they will code the program

d. Ballpoint pens or sharpened pencils
e. Blank notebook paper
f. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest uses competencies identified by the Computing Technology Industry Association. The specific projects chosen for national competition will be determined by the Computer Programming technical committee.

Knowledge Performance

The contest includes a written knowledge test assessing knowledge of Visual Basic, Java, C++ or RPG or "other approved language." Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

Skill Performance

The contest includes a computer programming problem consisting of background information and program specifications with accompanying reference materials and description of program output requirements. An appropriate (successfully executable) computer program from design notes and instructions will be developed.

Contest Guidelines

1. The contestants will receive a packet that includes three or four projects.
2. Each project's specifications are written for either Visual Basic, Java, C++ or RPG.
3. Projects will be scored on the following six criteria: completeness, correctness of output, validation of input, internal documentation, efficiency of code, and quality of work.
4. The contest will also include an interview to assess contestants' ability to answer questions typical of an entry-level position for a computer programmer.

Standards and Competencies

CP 1.0 — Demonstrate knowledge of computer programming

1.1 Describe how programs and programming languages work
1.2 Describe the purposes and practices of structured programming

CP 2.0 — Perform competencies related to Java programming

2.1 Explain the structured programming paradigm
2.2 Identify the primary components of a Java program
2.3 Explain the basic syntax of a Java program
2.4 Demonstrate procedures for compiling and running a Java application
2.5 Demonstrate use of Java's online hypertext technology documentation
2.6 Demonstrate use of Java's identifiers to name variables, constants, and methods
2.7 Demonstrate use of Java's operators to write expressions
2.8 Explain the rules governing operand evaluation order and operator precedence
2.9 Summarize Java's variable naming conventions
2.10 Distinguish syntax errors, runtime errors and logic errors
2.11 Understand program flow control in selection and loop statements
2.12 Demonstrate use of methods in Java
2.13 Demonstrate use of declaring, initializing and accessing elements in arrays
2.14 Demonstrate use of the string class to process fixed strings

CP 3.0 — Perform competencies related to C++ programming

3.1 Write C++ programs using input/output statements
3.2 Write C++ programs using selection and iteration
3.3 Create C++ programs using functions
3.4 Write C++ programs using one-dimensional arrays
3.5 Properly document and debug C++ programs
3.6 Create object concepts and terminology
3.7 Implement those algorithms in the C++ programming language using classes
3.8 Debug C++ programs written by others
3.9 Use pointers in C++ programs
3.10 Use sequential files in C++ programs

CP 4.0 — Perform competencies related to Visual Basic programming

4.1 Demonstrate knowledge of the fundamentals of Visual Basic (VB) programming using Visual Basic.NET
4.2 Use sequential and random access files in VB programs
4.3 Use advanced controls and multiple controls in a business application
4.4 Use a database and database controls in a business application
4.5 Demonstrate knowledge of structured and object-oriented programming techniques through the process of subprograms, selection, and repetition in projects
4.6 Use GUI design principles in all projects

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

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. For more information, visit: http://www.nctm.org.

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: www2.mcrel.org/compendium/browse.asp.

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.ncte.org/standards.