Exploring Computer Science

EXAM INFORMATION	DESCRIPTION

Exam Number

802

Items

31

Points

49

Prerequisites

NONE

Recommended Course Length

ONE SEMESTER

National Career Cluster

INFORMATION TECHNOLOGY

SCIENCE, TECHNOLOGY, ENGINEERING, & MATHEMATICS

Performance Standards

INCLUDED (OPTIONAL)

Certificate Available

YES

Exploring Computer Science is designed to introduce students to the breadth of the field of computer science through an exploration of engaging and accessible topics. Rather than focusing the entire course on learning software tools or programming languages, the course is designed to focus the conceptual ideas of computing and help students understand why certain tools or languages might be utilized to solve particular problems. The goal of Exploring Computer Science is to develop in students the computational thinking practices of algorithm development, problem solving and programming within the context of problems that are relevant to the lives of today's students. Students will also be introduced to topics such as interface design, limits of computers and societal and ethical issues.

EXAM BLUEPRINT

STANDARD	PERCENTAGE OF EXAM
1- Components and Uses of a Computer	42%
2- Mathematics and Computer Science	28%
3- Introduction to Programming	30%
4- Computing and Data Analysis (Optional)	

STANDARD 1

Students will learn the components and uses of a computer.

Objective 1   Analyze the characteristics of hardware components including processor, operating system, RAM, ROM, hard drive, and input and output devices. Discuss gigahertz, kilobyte, megabyte, gigabyte and terabyte.

Objective 2   Determine the software applications for which computers can be used including word processing, presentation, spreadsheets, and browsers.

Objective 3   Use tools to yield requested data for Web searches including: search engines and appropriate keywords.

Objective 4   Evaluate the results of web searches and the reliability of information found on the Web including authority, purpose, coverage, accuracy, objectivity, currency, and accessibility.

Objective 5   Computers and tasks they perform:

1. Identify required functions for a device to be classified as a computer (takes input, processing; output; storage)
2. Identify examples of tasks that can and cannot be accomplished with a computer.

Objective 6   Describe changes technology has made on communication, privacy and social interactions.

1. Appropriate uses of Social Media

2. Permanence of online information

3. Methods of communication appropriate for different situations

4. Online safety

Standard 1 Performance Evaluation included below (Optional)

STANDARD 2

Students will focus on developing computational thinking skills and understanding the connections between mathematics and computer science.

Objective 1   Define computational practices (thought processes involved in expressing solutions to problems that can be carried out by a computer).

1. Role of communication and collaboration in problem solving (computational thinking)
2. Designing and implementing creative solutions

1. Persevering and troubleshooting- break down the problem

Objective 2   Solve a problem by applying appropriate problem-solving techniques:

1. Understand the Problem

2. Plan the Solution

3. Carry out the Plan

4. Review and Discuss your Solution

Objective 3   Define algorithm (a set of clearly defined, logical steps to solve a problem.)

Objective 4   Create algorithms to solve a problem.

1. Define and compare Sorting algorithms (include selection sort, quicksort

2. Create and use visual artifacts to solve a problem (diagram, chart, graph, table, etc.)

3. Use an algorithm to solve a minimum spanning tree

4. Give a real-world application of a minimum spanning tree (package delivery routes, networks, airlines, pipes, electrical grids)

Objective 5   Explain why binary numbers are used in computer science

1. Count in binary from 0-31
2. Understand the binary system or pattern for counting up to 8 digits.
3. Explain when a binary search would be more efficient than a linear search

Standard 2 Performance Evaluation included below (Optional)

STANDARD 3

Students are introduced to some basic programming issues associated with code design and development.

Objective 1   Create programs that correspond to a set of specifications including: create dialogue between two sprites, more sprites with accuracy, broadcast a message and receive the broadcast, respond to different events.

1. Design (storyboard) a program
2. Know the Scratch environment including sprites, scree/stage size and the following block categories.
   1. Events (green flag, sprite clicked, key pressed, broadcasting)
   2. Motion (move, turn, go to, glide)
   3. Looks (say/think, show/hide, switch costume, change size)
   4. Control (loops, conditions, wait)
   5. Operators/Math (variables, randomness)
3. Test – troubleshoot, locate and correct errors in a program.
4. Execute – run final working program

Objective 2   Explain the term iteration (repeating something multiple times) and give an example of iteration in programming

Objective 3   Analyze and explain how a particular program functions.

Objective 4   Discuss the ethical responsibility to society when creating apps or programs – including the following: improve the world around you, efficiency-making things easier, viruses, potential liability for misuse, potential security issues.

Standard 3 Performance Evaluation included below (Optional)

STANDARD 4 (Optional)

Students will explore how computing has facilitated new methods of managing and interpreting data.

Objective 1   Understand the uses of computer networks in today's society.

1. Explore the impact of home, school, and business networks.
2. Explore the impact of the Internet on society.

Objective 2   Identify functions and common network operating systems (NOS).

1. Identify the functions of a NOS. (File storage, printing, security, etc.)
2. Identify some common NOS's. (Microsoft Server, Linux, etc.)

Objective 3   Understand networking in a local and remote environment.

1. Examine the uses of a local network.
2. Compare and contrast wired, wireless, and cell networks.
3. Explore remote communications through the use of webinars, collaborative tools, online storage, cloud computing, remote desktop, etc.

Objective 4   Define the media transmission required for successful network communication.

1. Understand how media, medium, and message are related.

Standard 4 Performance Evaluation included below (Optional)

Exploring Computer Science

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of 8 or higher on the rating scale. Students may be encouraged to repeat the objectives until they average 8 or higher.

Student's Name: _____

Class: _____

PERFORMANCE STANDARDS RATING SCALE

| 0 | LIMITED SKILLS | 2 | ➔ | 4 | MODERATE SKILLS | 6 | ➔ | 8 | HIGH SKILLS | 10 |

STANDARD 1 - Components and Uses of a Computer   Score:

- ☐ Learn the characteristics that make certain tasks easy or difficult for computers
- ☐ Demonstrate the ability to use digital communications
- ☐ Identify ethical behavior and articulate both sides of ethical topics including responsibilities of software users and software developers with respect to intellectual property rights, software failures, and the piracy of software and other digital media
- ☐ Understand open-source software development and explore its implications
- ☐ Demonstrate an understanding of basic operating system features and functions
- ☐ Demonstrate and understanding of computers, computer hardware, computing devices, computer performance, peripherals, etc.

STANDARD 2 - Computational Thinking Skills   Score:

- ☐ Become "computational thinkers" by applying a variety of problem-solving techniques
- ☐ Use problem solving skills to troubleshoot software and hardware problems. Understand concepts related to software — updates, OS versions, virus or malware removal, Safe mode, Knowledge Base, Help, task management, etc.

STANDARD 3 - Basic Programming   Score:

- Design algorithms and create programming solutions to a variety of computational problems using an iterative development process in Scratch
- Demonstrate a knowledge of networking concepts
- Use common features and commands used by key software applications, including key application of word processing application of spreadsheet, and application of a presentation program to complete a variety of tasks.

STANDARD 4 - Data Analysis   Score:

- Use computers to translate, process, and visualize data in order to find patterns and test hypotheses
- Work with a variety of large data sets that illustrate how widespread access to data and information facilitates identification of problems
- Collect and generate data related to local community issues and discuss appropriate methods for data collection and aggregation of data necessary to support making a case of facilitating a discovery
- Use skills and applications learned to complete a cross curricular project

PERFORMANCE STANDARD AVERAGE SCORE:

Evaluator Name: _____

Evaluator Title: _____

Evaluator Signature: _____

Date: _____