

# Unit 1: Fundamentals of Java Programming

Content Area: **Business**  
Course(s): **Java**  
Time Period: **1st Marking Period**  
Length: **Weeks**  
Status: **Published**

## Unit Overview

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Introduction to the history and background of computers and programming languages. Binary representation of information and computer memory. Edit, compile and execute a simple Java program - Hello World! Basic language elements, Java syntax, programming errors and debugging. Introduction to control statements - if, if-else, while and for statements.

## Transfer

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Students will be able to independently use their learning to...

What kinds of long term, independent accomplishments are desired?

Write, edit, compile and run a simple Java program.

Use control statements if and if-else to make choices in a program.

Use control statements while and for to repeat a process in a program.

## Meaning

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## Understandings

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Students will understand that...

-What specifically do you want students to understand?

-What inferences should they make/grasp/realize?

Describe the history of computers.

Define the various hardware and software components.

Demonstrate the binary representation of data and programs in computers.

Describe the evolution of programming languages.

Discuss the fundamental concepts of object-oriented programming.

Explain Java is an important programming language.

Define JVM and byte code.

Describe the structure of a simple program.

Write a simple program.

Edit, compile, debug and run a program.

Format the output of a program.

Recognize compile time errors.

## **Essential Questions**

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Students will keep considering...

-What thought provoking questions will foster inquiry, meaning making and transfer?

What are the major hardware components and software systems?

What are the major input and output devices?

Why is Java an important programming language?

What are compile-time errors?

What is the purpose of program comments?

What are arithmetic expressions?

What are programming errors?

How do we use if and if-else statements effectively.

How do we use while and for statements effectively.

What is an infinite loop?

## **Application of Knowledge and Skill**

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### **Students will know...**

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Students will know...

What facts and basic concepts should students know and be able to recall?

The history of computers and evolution of programming languages.

A computer system consists of hardware and software that work together to help us solve problems.

All information used by a computer is represented in binary form.

Java programs include variables, arithmetic expressions, statements, objects, messages and methods.

The 3 basic steps in the coding process, editing, compiling and running.

Java programs use int data type for whole numbers and double for floating point numbers.

Java variable and method names consist of a letter followed by additional letters or digits.

Arithmetic expressions are evaluated according to precedence.

Strings may be concatenated to form a new string.

if and if-else statements are used to make one-way and two-way decisions.

The while loop allows a program to run a set of statements repeatedly until a condition becomes false.

The for loop is a more concise version of the while loop.

## **Students will be skilled at...**

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Students will be skilled at...

The history of computers and programming languages.

Binary representation of information and computer memory.

Opening the JVM and edit, compile and execute the Hello World program.

Using basic Java syntax and semantics.

Using terminal I/O for different data types.

Using comments appropriately in a program.

Identify bugs and debugging a program.

Using if and if-else statements in a program.

Using while and for statement in a program.

## **Academic Vocabulary**

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bit byte CPU hardware object-oriented programming primary memory RAM ROM secondary memory software assignment operator byte code GUI IDE Java virtual machine parameter source code statement terminal I/O interface variable arithmetic expression comments exception literal logic error package pseudo code reserved words run-time error semantics syntax virus control statements counter count-controlled loop flowchart infinite loop iteration off-by-one error overloading sentinel task-controlled loop

## **Learning Goal 1**

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Students will define computing in general, hardware and software, the representation of information in binary, and general concepts of object-oriented programming.

- Students will discuss computing in general, hardware and software, the representation of information in binary, and general concepts of object-oriented programming.

## **Target 1**

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SWBAT describe how hardware and software make up computer architecture.

- SWBAT describe how hardware and software make up computer architecture.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.E.2	Analyze the relationships between internal and external computer components.

## **Target 2**

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SWBAT understand the binary representation of data and programs in computers.

- SWBAT understand the binary representation of data and programs in computers.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.E.2	Analyze the relationships between internal and external computer components.

## **Target 3**

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SWBAT discuss the evolution of programming languages.

- SWBAT discuss the evolution of programming languages.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.E.2	Analyze the relationships between internal and external computer components.

## **Target 4**

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SWBAT describe the software development process and the fundamental concepts of object-oriented programming.

- SWBAT describe the software development process and the fundamental concepts of object-oriented programming.

TECH.8.1.12.A Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.

TECH.8.1.12.A.CS1 Understand and use technology systems.

## **Learning Goal 2**

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Students will become acquainted with a Java programming environment, the structure of a simple Java program, and the basic ideas of variables, input and output streams and sending messages to objects.

## **Target 1**

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SWBAT discuss the importance of the Java programming language.

TECH.8.1.12.A Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.

TECH.8.1.12.A.CS1 Understand and use technology systems.

## **Target 2**

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SWBAT describe the structure of a Java program and write a simple program.

TECH.8.1.12.A Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.

TECH.8.1.12.B Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.

TECH.8.2.12.E.3 Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).

TECH.8.2.12.E.CS1 Computational thinking and computer programming as tools used in design and engineering.

## **Target 3**

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SWBAT edit, compile and run a program using a Java development environment.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## **Target 4**

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SWBAT understand compile-time errors.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## **Learning Goal 3**

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Students will discuss the basic elements of the Java language in detail and explore how to find and correct errors in programs.

## **Target 1**

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SWBAT construct and use numeric and string literals.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge

and develop innovative products and process using technology.

TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## Target 2

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SWBAT name and use variables and constants.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## Target 3

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SWBAT create arithmetic expressions and understand the precedence of different arithmetic operators.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## Target 4

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SWBAT know how to and when to use comments in a program.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.



TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## **Target 5**

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SWBAT tell the difference between syntax errors, run-time errors and logic errors.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## **Target 6**

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SWBAT insert output statements to debug a program.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## **Learning Goal 4**

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Students will be introduced to control statements.

## **Target 1**

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SWBAT use the increment and decrement operators and standard math methods.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## **Target 2**

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SWBAT use if and if-else statements to make choices.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## **Target 3**

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SWBAT use while and for loops to repeat a process.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## **Target 4**

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SWBAT construct appropriate conditions for control statements using relational operators.

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

## **Summative Assessment**

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Unit assessment, project based assessments, tests and quizzes.

## **21st Century Life and Careers**

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CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

## **Formative Assessment and Performance Opportunities**

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Oral question & answer discussion, in-class observation, written exercises, classwork & homework assignments, power point w/ notes, projects, portfolios, quizzes and tests.

## **Accommodations/Modifications**

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Additional Practice - See attached document.

All instruction, labs, activities, and assessments will be modified and enhanced to adhere to individual student's IEPs and 504s. As well differentiated classroom management strategies will be utilized as to adhere to these students individual plans as well.

## **Unit Resources**

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Computer, textbook (Fundamentals of Java,Cengage, 2003), supplemental textbook materials, Internet resources, teacher generated power points & notes and lab materials.

- Computer Work Stations
- Internet Resources
- Lab Materials
- Supplemental Textbook Materials
- Teacher Created Power Point
- Textbook

## **Interdisciplinary Connections**

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LA.RST.11-12.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LA.RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
MA.K-12.1	Make sense of problems and persevere in solving them.