

Unit 2: Defining Classes, Control Statements & GUI

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

Unit Overview

Introduction to defining classes and the internal structure of classes and objects. Control statements, logical operators, nested if statements, nested loops and improving the user interface.

Transfer

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

-What kinds of long term, independent accomplishments are desired?

Edit, compile and test the Student class.

Testing nested if statement and nested loops.

Improving the user interface - menu driven or GUI based.

Meaning

Understandings

Students will understand that...

-What specifically do you want students to understand?

-What inferences should they make/grasp/realize?

Construct and use numeric and string literals.

Name and use variables and constants.

Create arithmetic expressions.

Understand precedence of different arithmetic operators.

Concatenate two strings or a number and a string.

Know how to use comments in a program.

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

Insert output statements to debug a program.

Use the increment and decrement operators.

Use standard math methods.

Use if and if-else statements to make choices.

Use while and for loops to repeat a process.

Construct appropriate conditions for control statements using relational operators.

Detect and correct common errors involving loops.

Draw flow charts.

Essential Questions

Students will keep considering...

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

What is the difference between a class and an instance of a class?

What is the difference between the visibility modifiers public and private?

How does a parameter transmit data to a method?

What are local variables and how should they be used in a program?

How do you construct a menu-driven terminal interface?

What are some of the different ways that you could improve the user interface?

Application of Knowledge and Skill

Students will know...

Students will know...

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

Java class definitions consist of instance variables, constructors and methods.

Constructors initialize an object's instance variables when the object is created.

Mutator methods modify an object's instance variables and accessor methods allow clients to observe the value of these variables.

public is used to make methods visible to clients and private is used to restrict access to variables and methods.

Helper methods are called from other methods in a class definition.

Variables within a class definition can be instance variables, local variables or parameters.

A complex Boolean expression contains one or more Boolean expression and logical operators.

Java uses short-circuit evaluation of complex Boolean expressions.

Nested if statements are another way of expressing complex conditions.

Loops can be nested in other loops.

Equivalence classes, boundary conditions and extreme conditions are important features used in tests of control structures involving complex conditions.

A GUI allows the user to interact with a program by displaying window objects and handling mouse events.

GUI based programs are more complex than terminal based programs.

Students will be skilled at...

Students will be skilled at...

What discrete skills and processes should students be able to use?

Edit, compile and test the Student class.

Use logical operators appropriately.

Test if and nested if statements.

Test loops and nested loop statements.

Edit, compile and test the Thermometer class in a GUI based program.

Format output.

Academic Vocabulary

accessor actual parameter behavior constructor encapsulation formal parameter helper method
identity instantiation lifetime mutator scope state visibility modifier arithmetic overflow boundry
condition combiination explosion complete code coverage equivalence class extended if statement
extreme condition logical operator nested if statement nested loop quality assurance robust truth
table button object double filed object integer field object label object message box query-controlled
input structure chart text area object text field object window object

Learning Goal 1

Explore the internal working of objects and introduce the basic structure of class definitions, so that you will be able to read, modify and create classes.

Target 1

SWBAT design and implement a simple class from user requirements.

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

SWBAT organize a program in terms of a class and a model class.

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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

SWBAT write appropriate mutator methods, accessor methods and constructors for a class.

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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

SWBAT use instance variables, local variables and parameters appropriately.

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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

SWBAT use visibility modifiers to make methods visible to clients and restrict access to data within a class.

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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 2

Explore advanced topics of control statements and describe strategies for testing programs that contain control statements.

Target 1

SWBAT construct complex Boolean expressions using logical operators &&(AND), ||(OR), and !(NOT).

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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

SWBAT construct truth tables for Boolean expressions.

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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

SWBAT understand the logic of nested if statements and extended if statements.

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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

SWBAT construct nested loops and create appropriate test for if statements and loops.

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

Explore several techniques for improving and enhancing terminal-based interfaces and graphical user interfaces.

Target 1

SWBAT construct a query-driven terminal interface, menu-driven terminal interface and a graphical user interface.

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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

SWBAT position window objects in a grid within a window and write a method to handle users' interactions with command buttons.

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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

SWBAT manipulate window objects to input and output integers, doubles and text.

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Summative Assessment

Unit assessment, project based assessments, tests and quizzes.

21st Century Life and Careers

CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
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.

Formative Assessment and Performance Opportunities

Extra Class Practice - See Attached Documents

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

Accommodations/Modifications

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

Computer, textbook, 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

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.5	Use appropriate tools strategically.
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.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.