Unit 02: Using Objects

Content Area: **Computer Science**
Course(s):
Time Period: **Marking Period 1**
Length: **3-4 Weeks**
Status: **Published**

Summary

This unit introduces a new type of data: reference data. Reference data allows real-world objects to be represented in varying degrees specific to a programmer's purpose. This unit builds on students' ability to write expressions by introducing them to Math class methods to write expressions for generating random numbers and other more complex operations. In addition, strings and the existing methods within the String class are an important topic within this unit. Knowing how to declare variables or call methods on objects is necessary throughout the course but will be very important in later units.

Revision Date: July 2026

Diversity and Inclusion: Students will focus on equity, inclusion, and tolerance when analyzing the comparison of various quantities regarding characteristics of people. Equality will also be highlighted through the topic of citizenship. This can be associated with treating people fairly and equally.

1	Make sense of problems and persevere in solving them
S.ID.A	Summarize, represent, and interpret data on a single count or measurement variable
L.SS.11–12.1	Demonstrate command of the system and structure of the English language when writing or speaking.
A.APR.A	Perform arithmetic operations on polynomials
2	Reason abstractly and quantitatively
P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
L.KL.11–12.2	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
S.ID.B	Summarize, represent, and interpret data on two categorical and quantitative variables
8.1.12.DA.2	Describe the trade-offs in how and where data is organized and stored.
8.1.12.AP.1	Design algorithms to solve computational problems using a combination of original and existing algorithms.
9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).
9.4.12.IML.4	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
8.1.12.AP.6	Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.

Essential Questions & Essential Understanding

- How are information and functions encapsulated?
- How are real world objects represented in Java?
- What are access modifiers?
- What is reference data?
- What is the difference between static and non static methods?

Objectives

Students Will Know

- how to utilize the Math and String classes and their methods.
- that objects are instances of classes, and how they are represented in Java.
- the difference between immutable and mutable objects.
- about default classes available in the current version of Java.

Students Will Be Skilled At

- creating Java's version of random numbers.
- calling methods from various prebuilt classes.
- reading error messages and debugging their programs from common errors surrounding objects.

Learning Plan

Lecture and demonstrate the class Math and how to call methods from another class.

Pair programming exercise on formula creation, dice rolling, and random events.

Lecture and demonstrate the String class and the methods associated. Discuss immutable objects.

Pair progrmming labs using String input & output.

Assessment

Assessments

- Formative: Daily assessments using examples from class notes and CodeHS.com, AP Classroom/Albert Checks for Understanding
- Summative: Teacher-created assessments/projects and CodeHS Computer Science Projects, AP

Classroom/Albert Unit Assessments

- Benchmark: Check for understanding benchmark assessments on CodeHS, AP Classroom/Albert/Khan Academy Diagnostics

- Alternative Assessments: Student-centered activities such as a doorbell coding project, game design projects, and other activities involving real world applications

complete performance tasks:

- Students will be able to design programs using appropriate code.
- Students will be able to write programs using appropriate code.

complete quizzes/tests:

- Math class
- String class
- calling methods

complete sample AP multiple choice questions.

Materials

Core instructional materials: Computing Concepts with Java

Supplemental instructional materials:

Java Concepts for AP Computer Science Study Guide
CollegeBoard AP Classroom Website
CollegeBoard AP Computer Science A Website

Integrated Accommodations

Possible accommodations/modification for AP Computer Science A