

## SUGGESTED SKILLS

## 1.B

Determine code that would be used to complete code segments.

## 2.B

Determine the result or output based on statement execution order in a code segment without method calls (other than output).

## 3.C

Write program code to satisfy method specifications using expressions, conditional statements, and iterative statements.



## AVAILABLE RESOURCES

- Runestone Academy: AP CSA—Java Review: 7.2—While Loops
- Practice-It!: BJP4 Chapter 5: Program Logic and Indefinite Loops—Exercises 5.1–5.4
- The Exam > 2017 AP Computer Science A Exam Free-Response Question #3, Part B (Phrase)

## TOPIC 4.1

# while Loops

### Required Course Content

#### ENDURING UNDERSTANDING

**CON-2**

Programmers incorporate iteration and selection into code as a way of providing instructions for the computer to process each of the many possible input values.

#### LEARNING OBJECTIVE

**CON-2.C**

Represent iterative processes using a `while` loop.

#### ESSENTIAL KNOWLEDGE

**CON-2.C.1**

Iteration statements change the flow of control by repeating a set of statements zero or more times until a condition is met.

**CON-2.C.2**

In loops, the Boolean expression is evaluated before each iteration of the loop body, including the first. When the expression evaluates to `true`, the loop body is executed. This continues until the expression evaluates to `false`, whereupon the iteration ceases.

**CON-2.C.3**

A loop is an infinite loop when the Boolean expression always evaluates to `true`.

**CON-2.C.4**

If the Boolean expression evaluates to `false` initially, the loop body is not executed at all.

**CON-2.C.5**

Executing a `return` statement inside an iteration statement will halt the loop and exit the method or constructor.

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**LEARNING OBJECTIVE****CON-2.D**

For algorithms in the context of a particular specification that does not require the use of traversals:

- a. Identify standard algorithms.
- b. Modify standard algorithms.
- c. Develop an algorithm.

**ESSENTIAL KNOWLEDGE****CON-2.D.1**

There are standard algorithms to:

- Identify if an integer is or is not evenly divisible by another integer
- Identify the individual digits in an integer
- Determine the frequency with which a specific criterion is met

**CON-2.D.2**

There are standard algorithms to:

- Determine a minimum or maximum value
- Compute a sum, average, or mode

## SUGGESTED SKILLS

## 3.C

Write program code to satisfy method specifications using expressions, conditional statements, and iterative statements.

## 4.C

Determine if two or more code segments yield equivalent results.

## 5.C

Explain how the result of program code changes, given a change to the initial code.



## AVAILABLE RESOURCES

- Runestone Academy: AP CSA—Java Review: 7.3—For Loops
- Practice-It!: BJP4 Chapter 2: Primitive Data and Definite Loops—Exercises 2.2, 2.3

## TOPIC 4.2

# for Loops

### Required Course Content

#### ENDURING UNDERSTANDING

## CON-2

Programmers incorporate iteration and selection into code as a way of providing instructions for the computer to process each of the many possible input values.

#### LEARNING OBJECTIVE

## CON-2.E

Represent iterative processes using a `for` loop.

#### ESSENTIAL KNOWLEDGE

## CON-2.E.1

There are three parts in a `for` loop header: the initialization, the Boolean expression, and the increment. The increment statement can also be a decrement statement.

## CON-2.E.2

In a `for` loop, the initialization statement is only executed once before the first Boolean expression evaluation. The variable being initialized is referred to as a loop control variable.

## CON-2.E.3

In each iteration of a `for` loop, the increment statement is executed after the entire loop body is executed and before the Boolean expression is evaluated again.

## CON-2.E.4

A `for` loop can be rewritten into an equivalent `while` loop and vice versa.

## CON-2.E.5

“Off by one” errors occur when the iteration statement loops one time too many or one time too few.

## TOPIC 4.3

# Developing Algorithms Using Strings

## Required Course Content

### ENDURING UNDERSTANDING

**CON-2**

Programmers incorporate iteration and selection into code as a way of providing instructions for the computer to process each of the many possible input values.

### LEARNING OBJECTIVE

**CON-2.F**

For algorithms in the context of a particular specification that involves `String` objects:

- Identify standard algorithms.
- Modify standard algorithms.
- Develop an algorithm.

### ESSENTIAL KNOWLEDGE

**CON-2.F.1**

There are standard algorithms that utilize `String` traversals to:

- Find if one or more substrings has a particular property
- Determine the number of substrings that meet specific criteria
- Create a new string with the characters reversed

**SUGGESTED SKILLS****2.C**

Determine the result or output based on the statement execution order in a code segment containing method calls.

**3.C**

Write program code to satisfy method specifications using expressions, conditional statements, and iterative statements.

**AVAILABLE RESOURCES**

- Practice-It!: **BJP4 Chapter 3: Parameters and Objects—Exercise 3.19**
- Practice-It!: **BJP4 Chapter 5: Program Logic and Indefinite Loops—Exercise 5.24**
- CodingBat Java: **String-2**

## SUGGESTED SKILLS

## 1.B

Determine code that would be used to complete code segments.

## 3.C

Write program code to satisfy method specifications using expressions, conditional statements, and iterative statements.

## 5.C

Explain how the result of program code changes, given a change to the initial code.



## AVAILABLE LAB

- Classroom Resources > [AP Computer Science A: Consumer Review Lab](#)

## AVAILABLE RESOURCES

- [Runestone Academy: AP CSA—Java Review: 7.4—Nested For Loops](#)
- [Practice-It!: BJP4 Chapter 2: Primitive Data and Definite Loops—Exercises 2.4–2.15](#)
- Past AP Free-Response Exam Questions on Methods and Control Structures on AP Question Bank

## TOPIC 4.4

## Nested Iteration

## Required Course Content

## ENDURING UNDERSTANDING

## CON-2

Programmers incorporate iteration and selection into code as a way of providing instructions for the computer to process each of the many possible input values.

## LEARNING OBJECTIVE

## CON-2.G

Represent nested iterative processes.

## ESSENTIAL KNOWLEDGE

## CON-2.G.1

Nested iteration statements are iteration statements that appear in the body of another iteration statement.

## CON-2.G.2

When a loop is nested inside another loop, the inner loop must complete all its iterations before the outer loop can continue.

## TOPIC 4.5

# Informal Code Analysis

## SUGGESTED SKILL

## 2.D

Determine the number of times a code segment will execute.

## Required Course Content

### ENDURING UNDERSTANDING

**CON-2**

Programmers incorporate iteration and selection into code as a way of providing instructions for the computer to process each of the many possible input values.

### LEARNING OBJECTIVE

**CON-2.H**

Compute statement execution counts and informal run-time comparison of iterative statements.

### ESSENTIAL KNOWLEDGE

**CON-2.H.1**

A statement execution count indicates the number of times a statement is executed by the program.