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:

a. Identify standard algorithms.

b. Modify standard algorithms.

c. 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.