

2024



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# AP<sup>®</sup> Computer Science Principles

## Scoring Guidelines Set 1

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**Video, Program Requirements, and Written Response 1****3 points****General Scoring Notes**

- Written responses should be evaluated solely on the rationale provided.
- Responses must demonstrate all scoring criteria, including those within bulleted lists, in each reporting category to earn the point for that category.
- Terms and phrases defined in the terminology list are italicized when they first appear.

Reporting Category	Scoring Criteria	Decision Rules
<b>Course Project: Video</b>  <b>(0–1 points)</b>	The video demonstrates the running of the program including: <ul style="list-style-type: none"> <li>• <i>input</i></li> <li>• <i>program functionality</i></li> <li>• <i>output</i></li> </ul>	<p><b>Consider the video (or Program Code if necessary) when scoring this point.</b></p> <ul style="list-style-type: none"> <li>• The video needs to show at least one example of the program’s functionality.</li> <li>• If the source of the input is unclear from the video, consider the full program code file when scoring this point.</li> </ul> <p><b>Do NOT award a point if the following is true:</b></p> <ul style="list-style-type: none"> <li>• The video does not show a demonstration of the program running (screenshots or storyboards are not acceptable and would not be credited).</li> </ul>
<b>Course Project: Program Requirements</b>  <b>(0–1 points)</b>	The program code includes: <ul style="list-style-type: none"> <li>• <i>A student-developed procedure</i></li> <li>• <i>A call to the student-developed procedure</i></li> <li>• <i>A list (or other collection type)</i></li> <li>• <i>A use of the list</i></li> <li>• <i>Selection</i></li> <li>• <i>Iteration</i></li> </ul>	<p><b>Consider the Personalized Project Reference (or Program Code if necessary) when scoring this point.</b></p> <ul style="list-style-type: none"> <li>• If the program requirements do not appear in the Personalized Project Reference, consider the full program code file when scoring this point.</li> <li>• The procedure does not need to have a <i>parameter</i> to earn this point.</li> <li>• The <i>code segments</i> demonstrating selection and iteration do not need to appear in the same <i>algorithm</i> to earn this point.</li> <li>• The code segments demonstrating selection and iteration do not need to be contained in a procedure to earn this point.</li> </ul> <p><b>Do NOT award a point if any one or more of the following is true:</b></p> <ul style="list-style-type: none"> <li>• The list is a one-element list.</li> <li>• The use of the list is irrelevant (i.e., not connected to the program’s functionality).</li> <li>• The call to the procedure is inconsistent with the procedure header (unless allowed by the programming language).</li> <li>• The use of either the selection or the iteration is trivial (i.e., does not affect the outcome of the program).</li> </ul>

Reporting Category	Scoring Criteria	Decision Rules
<p><b>Written Response 1: Program Design, Function, and Purpose</b></p> <p><b>(0–1 points)</b></p>	<p>The written response:</p> <ul style="list-style-type: none"> <li>describes at least one valid input to the program.</li> <li>describes what the program does with the input.</li> </ul>	<p><b>Consider the Video (or Program Code if necessary) and Written Response 1 when scoring this point.</b></p> <ul style="list-style-type: none"> <li>If the video is not available or does not show the described input, consider the full program code file when scoring this point.</li> <li>Either a specific example of the input or a description of the input can meet this criteria.</li> <li>If a response describes an interaction with a device (e.g., mouse or keyboard) as input, it must describe what the program does with the input resulting from the interaction.</li> <li>Other forms of input could include databases, device inputs such as sensors, or command line arguments.</li> <li>The response does not need to describe all valid inputs to the program and what the program does with all of these inputs, but all descriptions given must be correct.</li> </ul> <p><b>Do NOT award a point if the following is true:</b></p> <ul style="list-style-type: none"> <li>The description of the valid input is implausible, inaccurate, or inconsistent with the program.</li> <li>The description of what the program does with the input(s) is implausible, inaccurate, or inconsistent with the program.</li> </ul>

**Written Response 2** **3 points**

**General Scoring Notes**

- Written responses should be evaluated solely on the rationale provided.
- Written responses must demonstrate all scoring criteria, including those within bulleted lists, in each reporting category to earn the point for that category.
- Terms and phrases defined in the terminology list are italicized when they first appear.

Reporting Category	Scoring Criteria	Decision Rules
<p><b>Written Response 2(a): Algorithm Development</b></p> <p><b>(0–1 points)</b></p>	<p>The written response:</p> <ul style="list-style-type: none"> <li>• describes what is being accomplished by the code in the body of the <i>iteration</i> statement.</li> </ul>	<p><b>Consider the Personalized Project Reference and Written Response 2(a) when scoring this point.</b></p> <ul style="list-style-type: none"> <li>• If multiple iteration statements are included in the Procedure section of the Personalized Project Reference, use the first iteration statement to determine whether the point is earned.</li> <li>• The first iteration statement can be found in either part (i) or part (ii) of the Procedure section of the Personalized Project Reference.</li> <li>• The iteration statement does not need to be contained in a procedure to earn this point.</li> <li>• If a procedure is identified, it does not need to contain a parameter to earn this point.</li> <li>• The response may describe a summary of what the iteration does in the context of the program or describe the purpose of each statement in the body of the iteration.</li> </ul> <p><b>Do NOT award a point if any one or more of the following is true:</b></p> <ul style="list-style-type: none"> <li>• The Procedure section of the Personalized Project Reference does not contain an iteration statement.</li> <li>• The description of what is being accomplished by the code does not match the code in the body of the first iteration statement.</li> <li>• The response only restates the lines of code in the body of the iteration statement.</li> <li>• The response describes a trivial use of iteration.</li> <li>• The response describes an iteration statement or behavior that is implausible, inaccurate, or inconsistent with the program.</li> </ul>

Reporting Category	Scoring Criteria	Decision Rules
<p><b>Written Response 2(b): Errors and Testing</b></p> <p><b>(0–1 points)</b></p>	<p>The written response:</p> <ul style="list-style-type: none"> <li>includes two calls to the <i>procedure</i>. Each call must cause a different program <i>code segment</i> in the procedure to execute.</li> <li>describes the expected behavior of each call.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>explains why it is not possible for two calls to the procedure to cause different code segments to execute.</li> </ul>	<p><b>Consider the Personalized Project Reference and Written Response 2(b) when scoring this point.</b></p> <ul style="list-style-type: none"> <li>If multiple procedures are included in part (i) of the Procedure section of the Personalized Project Reference:             <ul style="list-style-type: none"> <li>Use the procedure identified in the written response to determine whether the point is earned.</li> <li>If no procedure is identified in the written response, then use the first procedure to determine whether the point is earned.</li> </ul> </li> <li>The parameter(s) used in the procedure must be explicit. Explicit parameters are defined in the header of the procedure.</li> <li>A procedure that uses its parameter(s) to execute two different code segments can earn this point.</li> <li>A procedure that uses its parameter(s) to execute or bypass a code segment can earn this point.</li> <li>The syntax of the procedure calls does not need to be correct as long as the correct arguments are identified.</li> <li>A description of each call rather than program code is acceptable.</li> <li>A general description of argument value(s) is considered acceptable.</li> </ul> <p><b>Do NOT award a point if any one or more of the following is true:</b></p> <ul style="list-style-type: none"> <li>A procedure is not identified in part (i) of the Procedure section of the Personalized Project Reference.</li> <li>The response does not apply to the procedure in part (i) of the Procedure section of the Personalized Project Reference.</li> <li>The procedure identified in part (i) of the Procedure section of the Personalized Project Reference does not include at least one explicit parameter.</li> <li>The use of the explicit parameter is irrelevant (e.g., does not affect the code segment of the procedure that is executed or is reassigned before being used).</li> <li>The two calls are to two different procedures.</li> <li>The response describes expected behavior that is implausible, inaccurate, or inconsistent with the program.</li> </ul>

Reporting Category	Scoring Criteria	Decision Rules
<p><b>Written Response 2(c): Data and Procedural Abstraction</b></p> <p><b>(0–1 points)</b></p>	<p>The written response:</p> <ul style="list-style-type: none"> <li>explains in detailed steps an <i>algorithm</i> that uses <code>checkValidity</code> to check whether all elements in the <i>list</i> are considered valid.</li> </ul>	<p><b>Consider the Personalized Project Reference and Written Response 2(c) when scoring this point.</b></p> <ul style="list-style-type: none"> <li>If multiple lists are included in the List section of the Personalized Project Reference, use the list identified in the written response to determine whether the point is earned.</li> <li>The algorithm can be described in code, pseudocode, as a sequence of steps in English, or as a paragraph in English.</li> <li>The algorithm must describe how each element of the identified list is passed into <code>checkValidity</code> at least up to the first invalid element, if applicable.</li> </ul> <p><b>Do NOT award a point if any one or more of the following is true:</b></p> <ul style="list-style-type: none"> <li>A list is not identified in the List section of the Personalized Project Reference.</li> <li>If the algorithm described assumes the list contains a single element.</li> <li>The list identified in the Personalized Project Reference is not referenced in the response.</li> <li>The response implements <code>checkValidity</code> rather than describing its use.</li> <li>The response is too vague to allow another programmer to recreate the algorithm.</li> </ul>

## AP Computer Science Principles Create Performance Task Terminology

**Algorithm:** An algorithm is a finite set of instructions that accomplish a specific task. Every algorithm can be constructed using combinations of sequencing, selection, and iteration.

**Arguments:** The values of the parameters when a procedure is called.

**Code segment:** A code segment refers to a collection of program statements that are part of a program. For text-based, the collection of program statements should be continuous and within the same procedure. For block-based, the collection of program statements should be contained in the same starter block or what is referred to as a “Hat” block.

**Collection type:** Aggregates elements in a single structure. Some examples include: databases, hash tables, dictionaries, sets, or any other type that aggregates elements in a single structure.

**Data stored in a list:** Input into the list can be through an initialization or through some computation on other variables or list elements.

**Input:** Program input is data that are sent to a computer for processing by a program. Input can come in a variety of forms, such as tactile (through touch), audible, visual, or text. An event is associated with an action and supplies input data to a program.

**Iteration:** Iteration is a repetitive portion of an algorithm. Iteration repeats until a given condition is met or for a specified number of times. The use of recursion is a form of iteration.

**List:** A list is an ordered sequence of elements. The use of lists allows multiple related items to be represented using a single variable. Lists are referred to by different terms, such as arrays or arraylists, depending on the programming language.

**List being used:** Using a list means the program is creating new data from existing data or accessing multiple elements in the list.

**Output:** Program output is any data that are sent from a program to a device. Program output can come in a variety of forms, such as tactile, audible, visual, movement, or text.

**Parameter:** A parameter is an input variable of a procedure. Explicit parameters are defined in the procedure header. Implicit parameters are those that are assigned in anticipation of a call to the procedure. For example, an implicit parameter can be set through interaction with a graphical user interface.

**Procedure:** A procedure is a named group of programming instructions that may have parameters and return values. Procedures are referred to by different names, such as method, function, or constructor, depending on the programming language. A procedure is executed through the use of a procedure call.

**Program functionality:** The behavior of a program during execution, often described by how a user interacts with it.

**Purpose:** The problem being solved or creative interest being pursued through the program.

**Selection / conditional statement:** A selection / conditional statement affects the sequential flow of control by executing different statements based on a condition being true or false. The use of if-statements and try / exception statements are examples of selection / conditional statements.

**Sequencing:** The application of each step of an algorithm in the order in which the code statements are given.

**Student-developed procedure / algorithm:** Program code that is student-developed has been written (individually or collaboratively) by the student who submitted the response. Calls to existing program code or libraries can be included but are not considered student-developed. Event handlers are built-in abstractions in some languages and will therefore not be considered student-developed. In some block-based programming languages, event handlers begin with “when.”