AP® Computer Science Principles

Scoring Guidelines

AP® COMPUTER SCIENCE PRINCIPLES — CREATE PERFORMANCE TASK
2019 SCORING GUIDELINES

Reporting Category	Task	Scoring Criteria	Decision Rules	Scoring Notes
Row 1 **Developing a Program with a Purpose**	**VIDEO & RESPONSE 2A**	• The video demonstrates the running of at least one feature of the program submitted. **AND** • The response (audio narration or written response) identifies the purpose of the program (what the program is attempting to do).	• Response earns the point if it explains the function of the program instead of identifying the purpose. • Response earns the point if the illustrated feature runs, even if it does not function as intended. • Response earns the point if the response is included in the video via narration or some form of closed captioning and addresses the purpose or function of the program. **Do NOT award a point if any one of the following is true:** • a video is not submitted; or • the video does not illustrate the feature mentioned in the response; or • the video does not illustrate the running of the feature (screen shots or storyboards are not acceptable and would not be credited).	• Purpose means the intended goal or objective of the program. • Function means how the program works.
Row 2 **Developing a Program with a Purpose**	**RESPONSE 2B**	• Describes or outlines steps used in the incremental and iterative development process to create the entire program.	**Do NOT award a point if any one of the following is true:** • the response only includes the process for determining the program idea and does not address the development process used to create the entire program; or • the response does not indicate iterative development; or • refinement and revision are not connected to feedback, testing, or reflection; or • the response only describes the development at two specific points in time.	• Development processes are iterative and cyclical in nature and require students to reflect AND improve on what they have created. Examples of iterative development could include reflection, revision, testing and refining, and improvements based on feedback. • The incremental and iterative development process does not need to be a formal method such as waterfall, top-down, bottom-up, agile, etc.
Row 3 **Developing a Program with a Purpose**	**RESPONSE 2B**	• Specifically identifies at least two program development difficulties or opportunities. **AND** • Describes how the two identified difficulties or opportunities are resolved or incorporated.	• Response earns the point if it identifies two opportunities, or two difficulties, or one opportunity and one difficulty AND describes how each is resolved or incorporated. **Do NOT award a point if any one of the following is true:** • only one distinct difficulty or opportunity in the process is identified and described; or • the response does not describe how the difficulties or opportunities were resolved or incorporated.	
Row 4 **Applying Algorithms**	**CODE SEGMENT IN RESPONSE 2C**	• Selected code segment implements an algorithm.	**Do NOT award a point if any one of the following is true:** • the algorithm consists of a single instruction; or • the code segment consisting of the algorithm is not included in the written responses section or is not explicitly identified in the program code section; or • the algorithm is not explicitly identified (i.e., the entire program is selected as an algorithm, without explicitly identifying the code segment containing the algorithm).	• Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages. (EU 4.1) • Algorithms make use of sequencing, selection or iteration. (EK 4.1.1A)

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Row 5 **Applying Algorithms**	**RESPONSE 2C**	• Selected code segment implements an algorithm that uses mathematical or logical concepts. **AND** • Explains how the selected algorithm functions. **AND** • Describes what the selected algorithm does in relation to the overall purpose of the program.	• The algorithm being described can utilize existing language functionality or library calls. • Response earns the point even if the algorithm was not newly developed (i.e., a student's reimplementation of the algorithm to find the minimum value). • Mathematical and logical concepts can be a part of the selected algorithm or part of either of the included algorithms. **Do NOT award a point if any one of the following is true:** • the selected algorithm consists of a single instruction; or • the selected algorithm consists solely of library calls to existing language functionality; or • the selected algorithm does not include mathematical or logical concepts; • the response only describes what the selected algorithm does without explaining how it does it; or • the response does not explicitly address the program's purpose; or • the code segment consisting of the selected algorithm is not included in the written responses section or is not explicitly identified in the program code section; or • the algorithm is not explicitly identified (i.e., the entire program is selected as an algorithm, without explicitly identifying the code segment containing the algorithm).	• See Row 4 definitions and curriculum framework alignment. • Mathematical concepts include mathematical expressions using arithmetic operators and mathematical functions. (EK 5.5.1.D) • Logical concepts include Boolean algebra and compound expressions. (EK 5.5.1E and 5.5.1F) • Iteration is the repetition of part of an algorithm until a condition is met or for a specified number of times. (EK 4.1.1D) • Selection uses a Boolean condition to determine which of two parts of an algorithm is used. (EK 4.1.1C) • Iteration is the repetition of part of an algorithm until a condition is met or for a specified number of times. (EK 4.1.1D) • Selection uses a Boolean condition to determine which of two parts of an algorithm is used. (EK 4.1.1C)
Row 6 **Applying Algorithms**	**RESPONSE 2C**	• Selected code segment implements an algorithm that includes at least two or more algorithms. **AND** • At least one of the included algorithms uses mathematical or logical concepts. **AND** • Explains how one of the included algorithms functions independently.	• Responses are still eligible to earn this row, even if they do not earn row 5. • The included algorithms can be sub-parts of the algorithm in row 5. **Do NOT award a point if any one of the following is true:** • the selected algorithm consists of a single instruction; or • the selected algorithm consists solely of library calls to existing language functionality; or • neither of the included algorithms nor the selected algorithm that includes two or more algorithms uses mathematical or logical concepts; or • the code segment consisting of the algorithm is not included in the written responses section or is not explicitly identified in the program code section; or • the algorithm is not explicitly identified (i.e., the entire program is selected as an algorithm, without explicitly identifying the code segment containing the algorithm).	• See Row 4 and Row 5 definitions and curriculum framework alignment.

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Row 7
 	
Applying Abstraction
	CODE SEGMENT IN RESPONSE 2D	• Selected code segment is a student-developed abstraction.	• Responses that use existing abstractions to create a new abstraction, such as creating a list to represent a collection (e.g., a classroom, an inventory), would earn this point.
			
			Do NOT award a point if any one of the following is true:
			• the response is an ***existing*** abstraction such as variables, existing control structures, event handlers, APIs; or
			• the code segment consisting of the abstraction is not included in the written responses section or is not explicitly identified in the program code section; or
			• the abstraction is not explicitly identified (i.e., the entire program is selected as an abstraction, without explicitly identifying the code segment containing the abstraction).
				• The following are examples of abstractions (EK 5.3.1):
				  o Procedures
				  o Parameters
				  o Lists
				  o Application program interfaces (APIs)
				  o Libraries
				
				• Lists and other collections can be treated as abstract data types (ADTs) in developing programs. (EK 5.5.1I)

Row 8 **Applying Abstraction**	**RESPONSE 2D**	• Explains how the selected abstraction manages the complexity of the program.	• Responses should not be penalized for explanations of abstractions that are not developed by the student. **Do NOT award a point if any one of the following is true:** • the explanation does not apply to the selected abstraction; or • the abstraction is not explicitly identified (i.e., the entire program is selected as an abstraction, without explicitly identifying the code segment containing the abstraction).	• See Row 7 definitions and curriculum framework alignment.

AP® COMPUTER SCIENCE PRINCIPLES — EXPLORE PERFORMANCE TASK
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Row 1 **Using Development Processes and Tools**	**COMP. ARTIFACT**	The computational artifact: • Identifies the computing innovation. **AND** • Provides an illustration, representation, or explanation of the computing innovation's intended purpose, function, or effect.	The written response can be used to aid the understanding of how the computational artifact illustrates, represents, or explains the computing innovation's intended purpose, function, or effect. **Do NOT award a point if any one of the following is true:** • there is no artifact; or • the artifact is not a computational artifact; or • the innovation identified in the artifact does not match the innovation described in the written response; or • the artifact does not identify the innovation clearly; or • the artifact does not illustrate, represent or explain the innovation's intended purpose, function, or effect; or • the artifact illustrates a feature of the innovation instead of the purpose, function, or effect; or • the computational artifact doesn't clearly illustrate, represent, or explain as required in the scoring criteria AND the written response describes the innovation's intended purpose and function without explaining how the computational artifact illustrates, represents, or explains the intended purpose, function, or effect.	• A computational artifact is something created by a human using a computer and can be, but is not limited to, a program, an image, an audio, a video, a presentation, or a web page file. The computational artifact could solve a problem, show creative expression, or provide a viewer with new insight or knowledge. • A computing innovation is an innovation that includes a computer or program code as an integral part of its functionality.
Row 2 **Analyzing Impact of Computing**	**RESPONSE 2A**	• States a fact about the correctly identified computing innovation's intended purpose **OR** function.	**Do NOT award a point if:** • the identified innovation is not a computing innovation; or • the written statement gives an effect (which is required for the scoring criteria in Row 3, not Row 2).	• A computing innovation is an innovation that includes a computer or program code as an integral part of its functionality. • Computing innovations may be physical computing innovations such as Google glasses or self-driving cars, non-physical computer software like a cell phone app, or computing concepts such as e-commerce or social networking which rely on physical transactions conducted on the Internet. • Purpose means the intended goal or objective of the innovation. • Function means how the innovation works (e.g., consumes and produces data).
Row 3 **Analyzing Impact of Computing**	**RESPONSE 2C**	• Identifies at least **ONE** effect of the identified or described computing innovation.	The effect does not need to be specifically identified as beneficial or harmful. The effect must be identified, but it doesn't have to be described to earn the point. **Do NOT award a point if any one of the following is true:** • the described innovation is not a computing innovation; or • the identified effect is actually a purpose for using the computing innovation (e.g., allows me to make videos to share with my family); or • the identified effect is actually a function or use of the computing innovation (e.g., self-driving cars can drive me to work); or • the identified effect is not a result of the use of the innovation as intended (e.g., a self-driving car is not intended to crash, therefore, its exposure to hacking is not an effect of its intended use).	• An effect may be an impact, result, outcome, etc.

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Row 4 **Analyzing Impact of Computing**	**RESPONSE 2C**	• Identifies a beneficial effect of the identified or described computing innovation. **AND** • Identifies a harmful effect of the identified or described computing innovation.	Responses that earn this point will also earn the point for Row 3. Responses should be evaluated on the rationale provided in the response not on the interpretation or inference on the part of the scorer. **Do NOT award a point if any one of the following is true:** • the described innovation is not a computing innovation; or • the response is missing the adjectives harmful or beneficial (or synonyms thereof); or • the response is missing a plausible beneficial effect; or • the response is missing a plausible harmful effect; or • the identified effect is actually a purpose for using the computing innovation (e.g., allows me to make videos to share with my family); or • the identified effect is actually a function or use of the computing innovation (e.g., self-driving cars can drive me to work); or • the identified effect is not a result of the use of the innovation as intended (e.g., a self-driving car is not intended to crash, therefore, its exposure to hacking is not an effect of its intended use).	• An effect may be an impact, result, outcome, etc. • Beneficial and/or harmful effects are contextual and interpretive; identification includes both the classification of the effect as beneficial or harmful and justification for that classification.

Row 5
 	
Analyzing Impact of Computing
	RESPONSE 2C	• Explains how **ONE** of the identified effects relates to society, economy, or culture.	Responses that earn the point for this row must have earned the point for Row 3.
			
			Responses should be evaluated on the rationale provided in the response not on the interpretation or inference on the part of the scorer.
			
			Do NOT award a point if any one of the following is true:
			• the described innovation is not a computing innovation; or
			• the explanation does not connect one of the effects to society, economy, or culture.
				• Effects need to be related to society, economy, or culture. Groups or individuals can be used to represent society. Examples of effects include but are not limited to:
				  o The innovation and impact of social media online access varies in different countries and in different socioeconomic groups. (EK 7.4.1A)
				  o Mobile, wireless, and networked computing have an impact on innovation throughout the world. (EK 7.4.1B)
				  o The global distribution of computing resources raises issues of equity, access and power. (EK 7.4.1C)
				  o Groups and individuals are affected by the "digital divide." (EK 7.4.1D)
				  o Networks and infrastructure are supported by both commercial and governmental initiatives. (EK 7.4.1E)

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Row 6 **Analyzing Data and Information**	**RESPONSE 2D**	• Identifies the data that the identified or described computing innovation uses. **AND** • Explains how that data is consumed, produced, **OR** transformed.	Responses should be evaluated on the rationale provided in the response not on the interpretation or inference on the part of the scorer. **Do NOT award a point if any one of the following is true:** • the described innovation is not a computing innovation; or • the response does not state the specific name of the data or simply says "data"; or • the response confuses or conflates the innovation with the data: response fails to explain what happens to the data; or • the response confuses the source of the data with the data.	• Data types include: integers, numbers, Booleans, text, image, video, audio, signals. Data that infer these types like fingerprints, temperature, music, length, pictures, etc. are allowed. • Data collection devices (e.g., sensors, cameras, etc.) are not data. • Large data sets include data such as transactions, measurements, texts, sounds, images, and videos. (EK 3.2.2A)
Row 7 **Analyzing Data and Information**	**RESPONSE 2D**	• Identify one data storage, data privacy, **OR** data security concern related to the identified or described computing innovation.	Responses should be evaluated on the rationale provided in the response not on the interpretation or inference on the part of the scorer. Responses can earn this point even if they refer to the data in a general without specifically identifying the data being used. **Do NOT award a point if any one of the following is true:** • the described innovation is not a computing innovation; or • the response identifies or describes a concern that is not related to data.	

Row 8
 	
Finding and Evaluating Information
	RESPONSE 2E & ARTIFACT / WRITTEN RESPONSE	• References, through in-text citation, at least 3 different sources.	The in-text citations can appear in any text included in the artifact or the written response.
			The in-text citations may be oral in the computational artifact.
			
			Do NOT award a point if any one of the following is true:
			• the response contains a list of sources only, no in-text citations; or
			• the response contains less than three in-text citations; or
			• there are not three in-text citations with corresponding references.
				• In-text citations may be provided in any way that acknowledges the source:
				  o According to…" or "As written in the New York Times…"
				  o Parenthetical
				  o Footnotes
				  o Numerical superscripts with corresponding footnote
				  o Number system with a corresponding reference