AP Computer Science Principles

Sample Student Responses and Scoring Commentary

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☑ **Performance Task — Explore**

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Student Samples provided separately

Scoring Guidelines

The Explore Performance Task will be evaluated based upon the 7 discrete criteria listed below. Each criteria is scored individually on a binary scale (i.e., each criteria can earn a score of 1 or 0) for a total of 7 possible points.

The first criteria is evaluated based upon the computational artifact, using the written response as needed. The remaining six criteria are evaluated based upon the written response.

Computational Artifact (and Written Response as needed)

1   The computational artifact identifies the **computing innovation** and provides an illustration, representation, or explanation of the computing innovation's intended purpose, function, or effect.

Written Response

2   States a plausible fact about the **computing innovation's** intended purpose or function.

3   Identifies at least ONE effect of the **computing innovation**.

4   Identifies a beneficial effect AND a harmful effect of the **computing innovation**. Explains how ONE of the identified effects impacts or has the potential to impact society, economy, or culture.

5   Identifies the data that the **computing innovation** uses. Explains how that data is consumed, produced, OR transformed.

6   Identifies one storage, privacy, OR security concern. Explains how the concern is related to the **computing innovation**.

7   Provides inline citations of at least 3 attributed sources within the written response. The citations must be used to justify the response.

AP® COMPUTER SCIENCE PRINCIPLES 2017 SCORING GUIDELINES
Performance Task: Explore
Scoring Notes

Criteria	Response earns point if...	Response does not earn point if:	Additional notes/reminders
Using Development Processes and Tools ## Criteria 1: The computational artifact identifies the **computing innovation** and provides an illustration, representation, or explanation of the computing innovation's intended purpose, function, or effect. LO: 1.2.1 OR 1.2.2 Weighted: 20%	• There is an artifact. **AND** • The artifact identifies the innovation explicitly. **AND** • The artifact states or illustrates clearly a plausible function or purpose of the innovation.	• There is no artifact. • The artifact identifies an innovation that does not match the innovation described in the written responses. • the artifact and written response do not identify the innovation clearly • the artifact and written response do not give a function, purpose or effect of the innovation	• This score is based on the computational artifact. As needed, the written response can be used to provide clarification of the intent of the computational artifact to convene the computing innovation's name and intended purpose, function or effect. • The name of the computing innovation needs to be explicitly stated, not implied. • If the chosen innovation is a tool used to create the artifact, the artifact must illustrate the tool itself, not a product/outcome of the tool.
Analyzing Impact of Computing ## Criteria 2: States a plausible fact about the **computing innovation's** intended purpose or function. LO: 7.1.1, 7.3.1 Weighted: 10%	• The written statement includes the intended purpose or function of the computing innovation from a design perspective. (Think: how it works, what is it used for.)	• The written statement does not include the intended purpose or function of the innovation. • The written statement gives an effect (which is required for criteria #3, not criteria #2).	• This score should be based solely on the written responses. • Citations are allowed but not required here.
Analyzing Impact of Computing ## Criteria 3: Identifies at least ONE effect of the **computing innovation**. LO: 7.1.1, 7.3.1 Weighted: 15%	• The response states an effect (beneficial or harmful). (The effect does not need to be specifically identified as beneficial or harmful.)	• The response does not state an effect. (The purpose or function of the computing innovation is not the effect of the innovation.)	• This score should be based solely on the written responses. • The response does not need to describe the effect. • The response does not need to connect the effect with society, economy or culture. • The effect can be the same as one of the effects identified in criteria 4.

Criteria	Response earns point if...	Response does not earn point if:	Additional notes/reminders
Analyzing Impact of Computing Criteria 4: Identifies a beneficial effect AND a harmful effect of the **computing innovation**. Explains how ONE of the identified effects impacts society, economy, or culture. LO: 7.1.1, 7.3.1, 7.4.1 Weighted: 15%	● The response states a beneficial effect that is specifically identified as beneficial. **AND** ● The response states a harmful effect that is specifically identified as harmful. **AND** ● The response explicitly explains and connects at least ONE of the effects to society, economy or culture in a broad sense (i.e. overall population, not individual).	● The response is missing the adjectives harmful or beneficial (or synonyms thereof.) ● The response is missing a valid beneficial effect. ● The response is missing a valid harmful effect. ● The response is missing an impact on society, economy or culture in the broad sense. ● The harm is given as "hacking" and the innovation is not designed to hack. ● The impact is related to cost and the result is that people can't afford the innovation, or some will have the innovation and some will not will have the innovation (response must express why this leads to an impact on society, economy or culture as a result.)	● This score should be based solely on the written responses. ● The response can include similar words that mean "benefit" and "harmful". ● The purpose or function of the computing innovation is not the effect of the innovation. ● A single effect can be represented as both beneficial and harmful depending on the group that is impacted. ● Students who receive this point will get a point in criteria 3 as well. ● "Hacking" can be stated as a valid effect **only if** the computing innovation is a hacking device or is intended for hacking.
Analyzing Data and Information Criteria 5: Identifies the data that the **computing innovation** uses. Explains how that data is consumed, produced, OR transformed. LO: 3.3.1 Weighted: 15%	● The response identifies specific data or information types used by the computing innovation. **AND** ● The response explains or describes how the data is processed or used by the computing innovation (i.e. consumed, produced or transformed.)	● The response does not state the fundamental type(s) of the data or simply says "data". ● The response does not state clearly how the data is used or processed by the innovation.	● This score should be based solely on the written responses. ● Fundamental data types include: integers, numbers, booleans, text, image, video, audio, signals. Types that infer these types like temperature, music, length, pictures, etc. are allowed. ● Data collection devices (e.g. sensors, cameras, etc.) are not data.

Criteria	Response earns point if...	Response does not earn point if:	Additional notes/reminders
Analyzing Data and Information Criteria 6: Identifies one storage, privacy, OR security concern. Explains how the concern is related to the **computing innovation**. LO: 3.3.1 Weighted: 15%	● The response explicitly states <u>and</u> <u>justifies</u> a storage, privacy, or security concern. **AND** ● The response explains how the concern is related to the computing innovation.	● The response states a concern that is not related to storage, privacy or security. ● The response does not provide a consequence of the concern to justify that the concern is categorized as storage, privacy or security. ● The response states and justifies a concern but does not identify whether it belongs to storage, privacy and security.	● This score should be based solely on the written responses. ● Hacking is allowable as a security concern here if the response indicates the consequence (to show why it's a security concern) and connects the hacking to the innovation. (It is not enough to say that the security concern is that someone can hack the innovation and do bad things.) ● Cost is allowable as a storage concern if it is justified (the innovation must use very large amounts of memory) and there is a consequence to this requirement. (It is not enough to say that the storage concern is that the innovation requires a huge amount of memory which is expensive.)
Finding and Evaluating Information Criteria 7: Provides citations of at least 3 attributed sources with the written response. The citations must be used to justify the response. LO 7.5.2 Weighted: 10%	● The response includes at least three unique (non-duplicated) in-text citations **AND** at least three corresponding bibliography references.	● The response contains a bibliography only, no in-text citations. ● The response contains less than 3 citations and/or bibliography references. ● the response contains in-text citations that do not clearly link to bibliography references (e.g. numbered citations [1,2,3,etc] but references are not numbered)	● This score should be based solely on the written responses. ● Citations in the artifact (or lack thereof) are not to be considered in scoring. ● Citations may be written as "According to…" or "As written in the New York Times…" as long as the corresponding reference can be located in the bibliography. ● Citation styles can include but are not limited to name, superscript, number system. The type of in-text citations used does not have to be done correctly. Any format works as long as it is clear.

A **computational artifact** without citation or reference for image(s), video, or music used in the creation of the computational artifact is considered plagiarized work and should be returned to the student for correction by the teacher.

Explore Performance Task

Overview

Computing innovations impact our lives in ways that require considerable study and reflection for us to fully understand them. In the performance task, students explored a computing innovation of their choice. The close examination of this computing innovation deepened the students' understanding of computer science principles.

Sample: A

1 Innovation and Artifact Score: 1
2 Purpose or Function Fact Score: 1
3 One Effect of the Innovation Score: 1
4 Two Effects and One Impact Score: 1
5 Identifies and Explains Data Score: 0
6 IDs and Explains Data Concern Score: 0
7 Three Inline Citations Sources Score: 1

Criteria 1
The response earned the point for this row.
Although the video does not show autonomous cars, the narration does identify the innovation and states its purpose, to create safer roads for people to commute.

Criteria 2
The response earned the point for this row.
Its purpose is to provide a safer way to get from one place to another.

Criteria 3
The response earned the point for this row.
One benefit is fewer accidents.

Criteria 4
The response earned the point for this row.
The benefit is fewer car crashes.
The harm is the impact on car culture. The response states that "the thrill of independence and freedom being stripped away from driving."
The (beneficial) impact on society is that there will be fewer deaths.

Criteria 5
The response did not earn the point for this row.
Although the response states that data would be shared to improve the performance of self-driving cars, it does not state what that data is.

Criteria 6
The response did not earn the point for this row.
The response identifies security as a concern but does not justify why this is a concern. "Havoc on the roads" is not a valid justification to explain the security concern.

Criteria 7
The response earned the point for this row.
The response uses "according to" to provide at least three inline citations of attributed sources and a bibliography for these citations is given.

Sample: B

1 Innovation and Artifact Score: 1
2 Purpose or Function Fact Score: 1
3 One Effect of the Innovation Score: 1
4 Two Effects and One Impact Score: 1
5 Identifies and Explains Data Score: 1
6 IDs and Explains Data Concern Score: 1
7 Three Inline Citations Sources Score: 1

Criteria 1
The response earned the point for this row.
The response contains an artifact that identifies the innovation as the EQ Radio. The artifact describes the function of the innovation.

Criteria 2
The response earned the point for this row.
The response identifies the purpose of the EQ Radio as "determine what kind of emotion someone is feeling, even if they are attempting to hide it."

Criteria 3
The response earned the point for this row.
The response describes a beneficial effect: helping psychologists pick up on cues invisible to the naked eye.

Criteria 4
The response earned the point for this row.
The response identifies a beneficial effect (helping psychologists), a harmful effect (make people less social, understand emotions less), and a societal impact (used in the healthcare industry to locate signs of depression and anxiety).

Criteria 5
The response earned the point for this row.
The response identifies the data as heart rate and breathing patterns. The response describes the data being input into an algorithm that compares this data to other users and transforms that to a display of the resulting emotion.

Criteria 6
The response earned the point for this row.
The response gives a privacy concern that insurance companies can get a hold of the information (via cybercriminals) and increase rates.

Criteria 7
The response earned the point for this row.
The response includes at least 3 inline citations and corresponding references.

Sample: C

1 Innovation and Artifact Score: 1
2 Purpose or Function Fact Score: 1
3 One Effect of the Innovation Score: 1
4 Two Effects and One Impact Score: 0
5 Identifies and Explains Data Score: 1
6 IDs and Explains Data Concern Score: 0
7 Three Inline Citations Sources Score: 1

Criteria 1
The response earned the point for this row.
The computing innovation is the Global Positioning System (GPS). The intended purpose is determining your location as illustrated in the computational artifact.

Criteria 2
The response earned the point for this row.
The response indicates the purpose of GPS as originally created "for military purposes," and now for "driving directions, tracking lost items, monitoring the locations of children…"

Criteria 3
The response earned the point for this row.
The response indicates an effect that it increases "the safety of children or even teenagers."

Criteria 4
The response did not earn the point for this row.
The beneficial effect stated is that it would increase the safety of children. The harmful effect is that people would "not actually become familiar with the places they are going." The impact of these effects to society, economy or culture are not described. The response describes how children can be found but does not indicate how this affects society broadly. The response also states that if they could not use GPS, "they would be in trouble." The response does not indicate how either effect impacts society, economy, or culture in a broad sense.

Criteria 5
The response earned the point for this row.
The data being used is "data signals from several satellites that are in orbit around the Earth…. In general, the data it produces is the location." The response states these locations can be used to "figure out other things, like directions, speed, and more." which indicates how data is consumed.

Criteria 6
The response did not earn the point for this row.
The data security concern that is cited is "the government can track people's locations through their cell phone use." While the response does state that this is "pretty invasive," it does not state the consequence of this concern to justify why it is a security concern.

Criteria 7
The response earned the point for this row.
This response uses the authors name as in-text citations of at least three attributed sources.

Sample: D

1 Innovation and Artifact Score: 1
2 Purpose or Function Fact Score: 1
3 One Effect of the Innovation Score: 1
4 Two Effects and One Impact Score: 0
5 Identifies and Explains Data Score: 1
6 IDs and Explains Data Concern Score: 0
7 Three Inline Citations Sources Score: 1

Criteria 1
The response earned the point for this row.
The artifact identified the innovation and purpose as Android Auto, "a new program designed by google for cars and now native to android phones [1] to be able to translate the features used on someones [*sic*] android phone to the car's in dash head unit."

Criteria 2
The response earned the point for this row.
The intended purpose of the innovation is presented: translate the features used on someone's android phone to the car's in-dash head unit.

Criteria 3
The response earned the point for this row.
The response states an effect: "Android auto has the ability to cut down on driver distraction."

Criteria 4
The response did not earn the point for this row.
The response states a beneficial effect: "Android auto has the ability to cut down on driver distraction." The impact of this effect is that it "prevents distracted driving accidents." The response does not indicate a harmful effect directly caused by the innovation. The difficulty of using the innovation in some cars is not due to the innovation itself, but instead it is due to the car's interface or features.

Criteria 5
The response earned the point for this row.
Data is identified as google maps, your phone book, and streaming apps and the response indicates how the data is processed by being displayed to the screen in the car.

Criteria 6
The response did not earn the point for this row.
The response states a security concern (hacking) and privacy concern (tracking), but the security concern is not directly related to the innovation: "not from the program itself" and the privacy concern does not have a consequence that justifies it as a privacy concern.

Criteria 7
The response earned the point for this row.
At least three in text citations and references are included.

Sample: E

1 Innovation and Artifact Score: 1
2 Purpose or Function Fact Score: 1
3 One Effect of the Innovation Score: 1
4 Two Effects and One Impact Score: 0
5 Identifies and Explains Data Score: 0
6 IDs and Explains Data Concern Score: 0
7 Three Inline Citations Sources Score: 0

Criteria 1
The response earned the point for this row.
The artifact identifies the innovation as near field communication (NFC) and illustrates purpose: coming into contact with and transferring data back and forth.

Criteria 2
The response earned the point for this row.
The written response identifies the purpose: to "connect two devices that are near each other... to transfer data... without having to connect both of them through a cable or wireless network."

Criteria 3
The response earned the point for this row.
The beneficial effect given is the ability to pay for things with your mobile device at faster (transmission) rates.

Criteria 4
The response did not earn the point for this row.
The beneficial effect given is the ability to pay for things with your mobile device at faster (transmission) rates. The response does not identify an impact to society, economy, or culture. No clear harmful effect is identified.

Criteria 5
The response did not earn the point for this row.
The response describes the data used as "consumer's data," "credit card data," and "debit card data," but none of these are explicit enough. Also, "NFC can be consumed by users" does not explain how data is consumed.

Criteria 6
The response did not earn the point for this row.
The privacy and security concerns are stated briefly in section 2c, but consequences are not given. ("Google and Apple... can mine your data and do certain things with it." "People are scared of storing their debit and credit cards online.")

Criteria 7
This response did not earn the point for this row.
There are no in-text citations to reference the bibliography.