2022 Innovative Science Sample Student Work and Scoring Guide

Grade 8
Question 7: Constructed-Response

Reporting Category: Physical Science
Practice Category: Evidence, Reasoning, and Modeling: Evaluate claims and evidence to argue the best scientific explanation or engineering design solution, including developing and analyzing models to represent scientific phenomena and engineering concepts.
Standard: 7.PS.3.7 Use informational text to describe the relationship between kinetic and potential energy and illustrate conversions from one form to another. Clarification Statement: Types of kinetic energy include motion, sound, thermal, and light; types of potential energy include gravitational, elastic, and chemical
Item Description: Students will identify and explain different types of energy conversions that occurred in the two students' scooters into based on the simulation outputs and their knowledge of energy conversions.

Scoring Guide

Select a score point in the table to view the sample student response.

Score	Description
3	The response demonstrates a thorough understanding of the task by: • explaining that chemical potential energy in the battery is converted to another form of energy • using evidence to support an explanation that a difference in mass most likely caused the different use of energy from the battery • using the relationship between incline and energy to determine the likelihood of reaching different locations
2	The response demonstrates a general understanding of the task by correctly responding to two of the three bullets.
1	The response demonstrates a minimal understanding of the task by correctly responding to one of the three bullets.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

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Score Point 3

This question has three parts.

Click here to learn how to use the simulation.

Part A

Identify **one** form of energy the battery's chemical potential energy was converted into when Maya rode her scooter to the tech museum. Explain how you know the energy conversion took place.

one energy it was converted into is kinetic energy because thats how she was moving

Part B

Explain why the battery on Samuel's scooter had less energy than the battery on Maya's scooter after they traveled together to the tech museum.

it had less energy because samuel has a greater mass

Part C

After the tech museum, Maya and Samuel plan to go to either the library or a store. The table shows the distance and incline of the two routes and of their original route to the tech museum.

Route	Beginning Battery Level (%)	Distance (km)	Incline of Route (%)
scooter station to tech museum	100	5	3
tech museum to library	100	5	5
tech museum to store	100	5	10

Identify whether Samuel would be **more likely** to reach the library or the store without using all the charge in the battery. Explain your answer using data from the table.

he would be more likely to reach the library because the incline is less

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Score Point 2

This question has three parts.

Click here to learn how to use the simulation.

Part A

Identify **one** form of energy the battery's chemical potential energy was converted into when Maya rode her scooter to the tech museum. Explain how you know the energy conversion took place.

One form of energy that the battery's chemical potential energy was converted into when Maya rode her scooter to the tech museum is kinetic energy because the scooter is moving itself and since Maya is on top of the scooter the scooter is moving Maya too making kinetic energy.

Part B

Explain why the battery on Samuel's scooter had less energy than the battery on Maya's scooter after they traveled together to the tech museum.

The battery of Smaules's scooter had less energy than the battery on Maya's scooter is he has more mass. I got that beuase if they went the same rount then the incline would be the same so that wouldn't affect anything. They have the same scooters so teh speed is the same. So that cannot affect anything. Which leaves with mass which is unknow. For Samuel's scooter to have less battery the only option is for him to have more mas. I got that because the more mass you have iwth same inclien and speed teh more energy you take up.

Part C

After the tech museum, Maya and Samuel plan to go to either the library or a store. The table shows the distance and incline of the two routes and of their original route to the tech museum.

scooter station to tech museum	100	5	3
tech museum to library	100	5	5
tech museum to store	100	5	10

Identify whether Samuel would be **more likely** to reach the library or the store without using all the charge in the battery. Explain your answer using data from the table.

Samuel would likely reach the library or the store without using all the charge in the battery because they have more speed and have less mass, so even though they have more incline the mass and speed cancle it out.

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Score Point 1

This question has three parts.

Click here to learn how to use the simulation.

Part A

Identify **one** form of energy the battery's chemical potential energy was converted into when Maya rode her scooter to the tech museum. Explain how you know the energy conversion took place.

One form of energy the battery's chemical potential energy was converted into when Maya rode her scooter to the tech museum is kinetic energy because thats the mass every time they would ride their scooters.

Part B

Explain why the battery on Samuel's scooter had less energy than the battery on Maya's scooter after they traveled together to the tech museum.

Samuel's scooter had less energy than the battery on Maya's scooter after they traveled together to the tech museum because Samuel was going faster than Maya and he was using more of his potential energy (battery).

Part C

After the tech museum, Maya and Samuel plan to go to either the library or a store. The table shows the distance and incline of the two routes and of their original route to the tech museum.

Route	Beginning Battery Level (%)	Distance (km)	Incline of Route (%)
scooter station to tech museum	100	5	3
tech museum to library	100	5	5
tech museum to store	100	5	10

Identify whether Samuel would be **more likely** to reach the library or the store without using all the charge in the battery. Explain your answer using data from the table.

Samuel would be more likely to reach the library becauuse the incline route is only 5% and the incline route to the store is 10%. He would get to the library with more than 50% battery still in his scooter.

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Score Point 0

This question has three parts.

Click here to learn how to use the simulation.

Part A

Identify **one** form of energy the battery's chemical potential energy was converted into when Maya rode her scooter to the tech museum. Explain how you know the energy conversion took place.

One form of energy the battery's chemical potential energy was converted into when Maya rode her scooter to the tech museum is because the energy it took to get tho the museum wasn't a lot of energy like it took out of Samuel's scooter

Part B

Explain why the battery on Samuel's scooter had less energy than the battery on Maya's scooter after they traveled together to the tech museum.

I think that Samuel rode faster than Maya to the tech museum so that's why he had less energy. Also it could be that he maybe didn't charge this scooter to 100% and that's why it was almost dead when they got to the museum.

Part C

After the tech museum, Maya and Samuel plan to go to either the library or a store. The table shows the distance and incline of the two routes and of their original route to the tech museum.

Route	Beginning Battery Level (%)	Distance (km)	Incline of Route (%)
scooter station to tech museum	100	5	3
tech museum to library	100	5	5
tech museum to store	100	5	10

Identify whether Samuel would be **more likely** to reach the library or the store without using all the charge in the battery. Explain your answer using data from the table.

I think Samuel would probably reach the libary faster than the store. The libray is closer to where the tech museum is. so it would most likely be easier to go to the libary and use less energy than going to the store and using more energy.

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