Grade 5 Innovative Science and Technology/Engineering Sample Task

Spring 2021

The Department of Elementary and Secondary Education (DESE) is developing an innovative science assessment for grades 5 and 8 that uses a new type of performance task for students. Students engage with meaningful problems through interactive computer simulations to conduct investigations, create and explore models, and solve science or engineering challenges. In Spring of 2021, DESE piloted the assessment with a small cohort of 18 schools with roughly 2,300 students in grades 5 and 8. Three performance tasks were piloted per grade. DESE is publishing one pilot performance task per grade as a sample task.

Sample items from the pilot test are available online at https://ma-innov-sci.mypearsonsupport.com/practice-tests/. The sample items are collected from a mini test called an ePAT (electronic practice assessment tool). Items in the ePAT are displayed in TestNav 8, the testing platform used for the computer-based tests.

This document provides information about each item from the sample task, including the following:

- science content area (reporting category)
- standard covered
- practice category
- item type
- item description
- correct answer (for selected-response and technology-enhanced items)
- percentage of students in the pilot who answered the item correctly (Percent Correct)

Scoring rubrics are provided for constructed-response and simulation items.

Task Set Item Number	Reporting Category	Standard	Practice Category	Item Type*	Item Description	Answer	Percent Correct
(1)	Technology/ Engineering	5.ETS.3.2	Evidence, Reasoning, and Modeling	TE	Students will relate parts of the soda bottle moisture catcher to a commercial moisture catcher.	*see image*	46%

Drag and drop a label into each box in the table to show how the parts of the moisture collectors have similar functions. Not all labels will be used.

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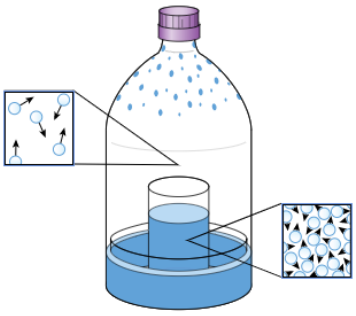
Function of Part	Plastic Bottle Moisture Collector	Moisture Collector from Website
holds fresh water	3	Y
changes water vapor to liquid	1	X

(2)	Physical Science	5.PS.1.1	Evidence, Reasoning, and Modeling	TE	Students will model and explain the phenomenon observed in the moisture collector by applying their understanding of the particle nature of solids, liquids, and gases.	*see image*	47%

Drag and drop a picture into each box in the model to show the movement of water particles for each phase. Not all pictures will be used.



Non-Scoreable Question	Technology/ Engineering	N/A	N/A	TE	This item was not scored. Item purpose is to introduce students to the simulation.

Click here to learn how to use the simulation.

This simulation will help you conduct investigations.

YOUR GOAL: **Determine how much fresh water can be collected on a cloudy day.**

- Set the **Salt Water Volume** to **Low** and **Cloudiness** to **Cloudy** and click **Start.**
- Observe how the amount of salt water and the amount of collected water change over time.

What was the amount of fresh water collected?

Enter your answer in the box.

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(3)	Technology/ Engineering	4.ETS.1.3	Investigations and Questioning	Part A: SIM/SR Part B: SR	Students will determine the relationship between initial volume of salt water and the final volume of fresh water.	Part A: *see image* Part B: B	26%

Part A:

YOUR GOAL: **Determine how the amount of salt water in the moisture collector affects the amount of fresh water that can be collected in 8 hours.**

In the simulation:

- Use the controls (**Salt Water Volume**, **Cloudiness**, or both) to choose the conditions.
- Run several models and observe the amounts of fresh water collected.
- Analyze the models to determine the relationship between the amount of salt water and the amount of fresh water that was collected.

From the models that were saved, select the 3 models that **best** helped you determine the relationship between the amount of salt water and the amount of fresh water collected in 8 hours.

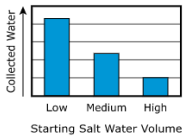
- ☐ A. Model A
- ☐ B. Model B
- ☐ C. Model C
- ☐ D. Model D
- ☐ E. Model E

Performance (Points)
Three models are selected: The three volumes of salt water were used and the cloudiness was kept the same in each of the three models. (1)
Fewer than three models were selected. OR The volume of salt water was kept the same. OR The cloudiness was changed. (0)

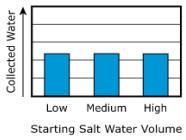
Part B:

Which bar graph shows the relationship between the starting volume of salt water in the cup and the amount of fresh water collected in 8 hours?

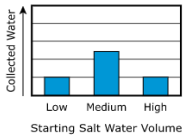
○ A.



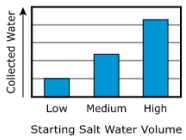
◉ B.



○ C.



○ D.



(4)	Technology/ Engineering	4.ETS.1.3	Investigations and Questioning	TE	Students will determine how to maximize the volume of fresh water collected in the moisture collector.	*see image*	32% earned 2 points

Part A:

What is the greatest amount of fresh water that can be collected in a single model?

Enter your answer in the box.

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Part A Scoring Notes

Either one of the following

8.5 OR 8.50

Part B:

Select from the drop-down menus to correctly complete the sentence.

The moisture collector collected the most fresh water in 8 hours when the **Cloudiness** control was set to [Sunny only] and the **Salt Water Volume** was set to [Low, Medium, or High].

(5)	Physical Science	5.PS.1.1	Evidence, Reasoning, and Modeling	TE	Students will use the particle model of matter to explain a phase change from a liquid to a gas based on the behavior of the particles involved.	Part A: *see image* Part B: A	29 % earned 2 points

Part A:

Select the answers from the drop-down menus to correctly complete the sentence.

The model or models that collected the **most** water had the [greatest] number of water particles that [changed state].

Part B:

Which of the following **best** describes the water particles in the salt water when the **Cloudiness** control was set to Sunny?

- (●) A. The water particles moved faster and turned into a gas.
- ( ) B. The water particles moved faster and turned into a solid.
- ( ) C. The water particles moved closer together and turned into a gas.
- ( ) D. The water particles moved closer together and turned into a solid.

(6)	Physical Science	5.PS.1.2	Mathematics and Data	SR	Students will determine which evidence shows that the mass of water is conserved in the moisture collector.	D	33%

A student made the claim shown.

> Water is **not** lost from the moisture collector in the simulation when salt water is changed to fresh water.

What can the student do to provide evidence for the claim made?

- ( ) A. compare the amounts of fresh water collected each hour
- ( ) B. compare the final amount of salt water to the starting amount of salt water
- ( ) C. compare the three starting amounts of salt water to the amount of collected fresh water
- (●) D. compare the final amounts of salt water and collected fresh water to the starting amount of salt water

(7)	Technology/ Engineering	3.ETS.1.2	Evidence, Reasoning, and Modeling	SR	Students will identify which actions should be taken that would increase the amount of fresh water produced by the moisture collector.	C	61%

Which action would **most likely** help the students collect a greater amount of fresh water?

- A. Use a taller cup for the salt water.
- B. Let more air in by removing the bottle cap.
- C. Heat the salt water to a higher temperature.
- D. Use a larger bottle for the moisture collector.

(8)	Physical Science	5.PS.1.1	Evidence, Reasoning, and Modeling	CR	Students will use climate data to explain where moisture collectors would be most useful and explain how the moisture collector works.	*see Scoring Guide***	See Percent of Students Scoring Table

Percent of Students Scoring	0 points	1 point	2 points	3 points	4 points
	56%	20%	17%	6%	1%

Scoring Guide	
Score	Description
4	The response demonstrates a thorough understanding of using evidence and scientific reasoning to explain phase changes. The response correctly identifies two locations where the collecting of fresh water would be similar and clearly explains the reasoning. The response also correctly identifies the location where a moisture collector would be most helpful and clearly explains the reasoning using data and knowledge of how moisture collectors work.
3	The response demonstrates a general understanding of using evidence and scientific reasoning to explain phase changes.
2	The response demonstrates a limited understanding of using evidence and scientific reasoning to explain phase changes.
1	The response demonstrates a minimal understanding of using evidence and scientific reasoning to explain phase changes.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

* Innovative Assessment item types are selected-response (SR), technology-enhanced (TE), simulation (SIM), and constructed-response (CR).
** Sample responses and scoring guidelines for constructed-response items will be posted to the Department's website later this year.