

3D Science Performance Assessment Tasks

3RD GRADE HOME, SWEET HOME



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Task Title	Home, Safe Home
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Standards Bundle Information

PEs

- 3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
- 3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.
- 3-ESS3-1: Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.
- 3-5 ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Practices

- Asking questions and defining problems
- Analyzing and interpreting data
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Cross-Cutting Concepts

- Patterns
- Cause and effect
- IETSS: People’s needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)

Core Ideas

- ESS3.B Natural Hazards
 - A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) *(Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)*
- ESS2.D Weather and Climate
 - Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)
 - Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)
- ETS1.A: Defining and Delimiting Engineering Problems
 - Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

CCSS ELA:

- Argument writing

CCSS Mathematics:

- Argument practice
- Analyzing data

Overview / Introduction of the Assessment Task

In this task students will design a meteorology station in Alaska, Death Valley, or a Caribbean Island. Create a model of the building design. Explain how key features address the following climate variables: average temperature, wind speeds, rainfall, and snowfall (other precipitation). Students will further explain how these features will protect from weather hazards in the area while also stating the benefits and the negatives.

Teacher Background

Teachers should review the PE's and corresponding three dimensions to fully understand this performance task.

Information for Classroom Use

Connections to Instruction: This performance task is designed to be a series of formative tasks and a final summative task related to 3rd grade weather.

Approximate Duration for the Summative Task:

- All components: 3 days
 - 1 for research
 - 1 for building and testing
 - 1 for reporting findings and to write individual reports

Assumptions: Students are familiar with weather types and understand climates. Students have studied climates of the world and the weather hazards that are found in each area.

Materials Needed:

- Country Studies [website](#)
- [Kid Crossing](#) website
- [Homes Powerpoint](#)
- [Look out for Dangerous Weather](#) exploration
- [Teach Engineering: Roof Design](#)
- [Dust Storm story- Read Works.org](#)
- [Hurricane information - weatherwizkids.com](#)
- [Winter Storm- weatherwizkids.com](#)
- [Region Note-Taking Guide](#)
- Innovation [website](#)
- [Presentation Rating Charts](#)
- [Science Station Argument](#)

Supplementary Resources:

[Homes around the World](#) video

Learning Performances

[Evidence Chart](#)

1. Select a season and analyze this data for the season that they selected. They will explain what the data tells them
2. Obtaining and communicating information by development of a poster describing weather hazards and their effects.
3. Students will study and test roof designs, finding those which work better in wind, snow, etc. Students will have identify the cause and effect relationship of a design solution to a weather related hazard.
4. Students will design a solution to a weather related hazard. They will further explain the merits of a given solution and give evidence to support their claim.
5. Students will design a solution to a weather related hazard.
6. They will describe the merits of a given solution and give evidence to support their claim.

Performance Assessments

Student Performances		
<i>Formative Assessment Task 1</i>	Learning Performance: Select a season and analyze this data for the season that they selected. They will explain what the data tells them	Expected Duration: 1 day
	Description (Phenomena, Scenario, Task) Given data students will analyze and interpret data to explain how weather influences our choices.	
	Directions <ol style="list-style-type: none"> 1. Have students pick a state other than Michigan and Michigan, Print the data and have students compare average high and low temperature and precipitation using the following Country Studies website. 2. Think about the seasons. What patterns do you see? 3. How would this information help us plan events for the next year? What weather hazards could change these plans? 	
	Scoring / Teacher Look-For's: Students must recognize the relationship between weather and climate. They must also recognize the patterns and see the differences between the two cities.	
<i>Formative Assessment Task 2</i>	Learning Performance: Obtaining and communicating information by development of a poster describing weather hazards and their effects.	Expected Duration: 2 days/45 mins.
	Description (Phenomena, Scenario, Task) Students will make a poster for weather events.	
	Directions - <ol style="list-style-type: none"> 1. Students will visit the Kid Crossing website. Have students click on the "LOOK OUT FOR DANGEROUS WEATHER". Students will focus on hurricanes, tornadoes, and blizzards. 2. The student should learn about each weather hazard "How they form" and understand the steps families can take to prepare and stay safe during a weather emergency and "safety" pages. 3. Students can apply this information to the following Look out for Dangerous Weather exploration. 4. Students will create safety posters or reports for each hazard. The poster should include problems that occur in each hazards and safety concerns with the structures. 	
	Scoring / Teacher Look-For's: Students should focus on the hazards and what can be done to protect people.	

Formative Assessment Task 3	Learning Performance: Students will study and test roof designs, finding those which work better in wind, snow, etc. Students will have identify the cause and effect relationship of a design solution to a weather related hazard.		Expected Duration: 3 to 4 sessions. 2 for testing and redesign
	Description (Phenomena, Scenario, Task): Students will test 3 roof designs and identify where each would be used based on weather related hazards. Students will further design and test roofs for a new hazard.		
	Directions : Directions are found in the following document: Teach Engineering: Roof Design		
	Scoring / Teacher Look-For's: Include in the following document: Teach Engineering: Roof Design		
Final Task: (Model, Design, Explain, Argue, Investigate)	Learning Performance : Students will design a solution to a weather related hazard. They will further explain the merits of a given solution and give evidence to support their claim.		Expected Duration: 2 sessions design 1 session presentation/reporting
	Phenomena: Homes Powerpoint		
	Goal Design a innovative design for a science station in _____ (Alaska, Death Valley, or the Caribbean Island). Create a model of your design. Explain how key features will protect during a natural weather hazard.	Role Students will act as a construction company, creating an innovative design for a science station for scientists who must work in hazardous weather conditions. Students are making construction recommendations that are best suited to seasonal differences and typical natural hazards within different climates such as: <ul style="list-style-type: none"> ● Caribbean Island (warm, wet, tropical, hurricanes) ● Death Valley - (hot, dry, rocky) ● Alaska (cold, tundra, snow) 	

	<p>Audience</p> <p>The audience is meteorologists who will be using the science station and the company that is funding the building of the science stations.</p>	<p>Situation</p> <p><i>Meteorologists have decided to build stations in a different climate with weather conditions different from Michigan. There are features of their current science station, which they would like to have in their new lab. Your role as an architect is to present a building design best suited to their new location (Death Valley, Caribbean Island or Alaska), which will withstand natural hazards in that area. You will need to convince the scientists and funders to choose your design by presenting evidence and reasoning for your recommendations of the structural features that will protect them during these hazards.</i></p>	
<p>Product / Performance</p> <p>Students will create a model of their new design. They will present their designs and explain their thinking about how their innovative building design will be safe and effective in withstanding weather hazards. The students will further select a design from the classes' models, which they believe to be the most effective for a particular location and defend their choice.</p>			
<p>Directions</p> <p>Procedure:</p> <ol style="list-style-type: none"> 1. Show students PowerPoint: Homes PowerPoint. Ask students to explain each picture. Ask students the following: <ol style="list-style-type: none"> a. What do you know about this climate? (temp, weather hazards, precipitation) b. What features does this building have to protect its owners? c. How does it help? Ex- steep roof, keeps heavy snow from damaging roof 2. Ask students “ What do we know about the climate of Alaska, the Caribbean island, and the desert? What weather events/hazards would occur in each area? 			

3. “What features would a house need to protect the inhabitants in this climate?” Discuss this with your group.
4. Show students the video: [Homes around the World](#) Then have a class discussion about how homes look different in different regions. Also address the weather hazards that would occur in those areas. You may want to show again the homes of Africa and Indonesia as example of different supplies were used. (That is what is available in the area)
5. Explain to students that they will be designing a science station for a group of Meteorologists who want to study the weather in three different regions. As a construction company, they will present a design that will keep the scientists safe from weather hazards in the region. The meteorologists want a cutting-edge innovative design to meet their needs.
6. Place students in groups and allow them to choose or assign them to one of the regions (Alaska, Death Valley, or Caribbean Island). In their groups give them the appropriate information to read and study together from the following resources:
 - a. [Dust Storm story- Read Works.org](#)
 - b. [Hurricane information - weatherwizkids.com](#)
 - c. [Winter Storm- weatherwizkids.com](#)

Have students take notes using the [Region Note-Taking Guide](#)
7. Show students the Innovation [website](#), and discuss what it means to be “innovative.” Ask students “Why is it important to be innovative in our designs?” Discuss as a whole class.
8. Within groups, have students brainstorm a “Gotta-Have Checklist” for a science station in their region. Merge groups together with the other groups from your region and have each region agree on what should be on a “Gotta-Have Checklist” for the station for their region. The checklist should contain criteria both for innovative design and to mitigate the weather hazard. Their checklist becomes the criteria that the groups will design their science station toward and that they will rank the designs on.
9. Students then create a model of their innovative science station for their climates. They will need to be sure to label the features and explain how the design will keep the scientists safe from weather hazards. They should also show what is innovative about the designs and be prepared to present their suggestions to the class. [Science Station Planning Guide](#)
10. Provide students time to work. Monitor the groups. Ask questions about how the features assist in that specific climate.
11. After students have completed their models have students, present their ideas to the class. [Presentation Rating Charts](#)

12. Ask students to take notes on each presentation. After the presentations, hang the models around the room. This will provide additional data for individual reports.
13. In teams, ask students to consider the designs for each region. Invite students to have dialog about which design is the best for the Alaska Science Station. Ask them to develop a claim with supporting evidence about the best design. Have students share their claim and evidence with the class. Repeat the process for each region, Caribbean followed by Desert.
14. Students will select one building from their region that they believe best meets the criteria in the Gotta Have Checklist developed earlier. They will first state a claim about the best design then support that with the ratings given during the presentations and describing why they were earned. This Claim and Evidence should address the following:
 - a. How the proposed solution addresses the problem, including the impact of the weather related hazard.
 - b. The merits of a given solution in reducing the impact of a weather-related hazard does the design solution meets the needs in that area
 - c. The benefits and risks a given solution reduces the impact of a hazard, making it safe for the meteorologists.
 - d. Why it is an innovative design?

[Science Station Argument](#) can be used to guide students in writing their argument

CheckBric

Student Name _____

Teacher Name _____

Learning Performance: Students will design a solution to a weather related hazard.					Comments
<ul style="list-style-type: none"> Student has created a model with three features, which addresses their hazards, conforming to the constraints assigned. 	1	2	3	4	
<ul style="list-style-type: none"> Explain how the proposed solution addresses the problem, including the impact of the weather related hazard experienced in that climate. 	1	2	3	4	
Learning Performance: They will further describe the merits of a given solution and give evidence to support their claim.					Comments
<ul style="list-style-type: none"> Student will make a claim about the best design choice for a given hazard. Student will give evidence to support their claim. 	1	2	3	4	
Student will evaluate the class design and select the one, which they believe to be the most beneficial.	1	2	3	4	
Student will recognize the cause and effect relationship of the design protecting scientist from the natural weather hazard.	1	2	3	4	
LP Total					
<i>Checkbric Total</i>					

4 Exemplary	Work at this level is of exceptional quality. It is both thorough and accurate. It exceeds the standard. It shows a sophisticated application of knowledge and skills.
3 Proficient	Work at this level meets the standard. It is acceptable work that demonstrates application of essential knowledge and skills. Minor errors or omissions do not detract from the overall quality.
2 Developing	Work at this level does not meet the standard. It shows basic, but inconsistent application of knowledge and skills. Minor errors or omissions detract from the overall quality. Your work needs further development.
1 Emerging	Work at this level shows a partial application of knowledge and skills. It is superficial (lacks depth), fragmented or incomplete and needs considerable development. Your work contains errors or omissions.