


Short Performance Assessment: 4-ESS2-1

Grade Level: **Fourth Grade**

Adapted from [SNAP](#)¹

Title	Melting Glaciers		
Designed by	Paul	Course(s)	Grade 4 NGSS
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Performance Expectation	<p>4-ESS2-1: Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p> <p>Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.</p> <p>Assessment Boundary: Assessment is limited to a single form of weathering or erosion.</p>
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Science and Engineering Practice	<p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none">• Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.
Disciplinary Core Ideas	<p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none">• Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. <p>ESS2.E: Biogeology</p> <ul style="list-style-type: none">• Living things affect the physical characteristics of their regions.
Crosscutting Concept	<p>Cause and Effect</p> <ul style="list-style-type: none">• Cause and effect relationships are routinely identified, tested, and used to explain change.

Student Performance	<ol style="list-style-type: none">1. Identifying the phenomenon under investigation2. Identifying the evidence to address the purpose of the investigation3. Planning the investigation4. Collecting the data
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¹ The Short Performance Assessment (SPA) and the Assessment Rubric adapted from the Stanford NGSS Assessment Project <http://snapgse.stanford.edu/>



Name _____

The Shrinking Glaciers of Glacier National Park



Background:

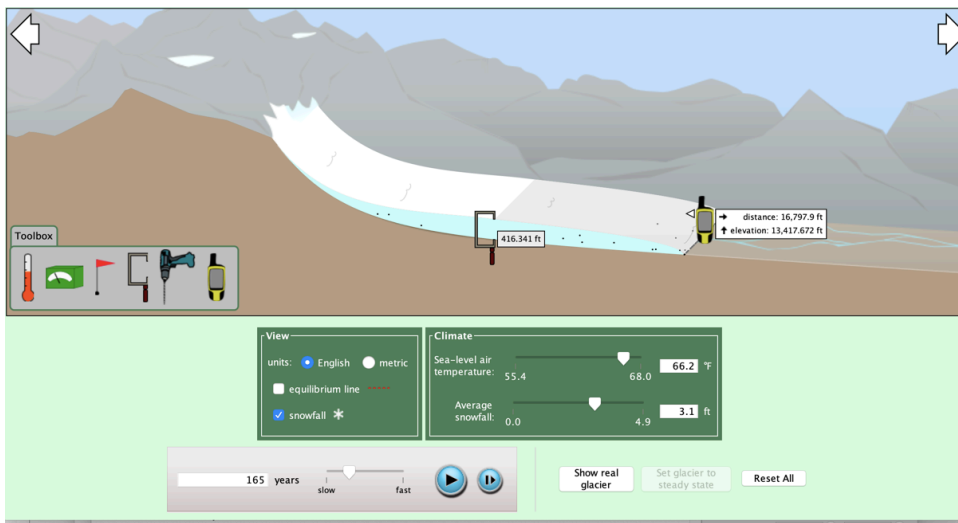
Read the first three paragraphs of the article from [Glacier National Park website](#). The image at the top of the page can be scrolled to show the change of Grinnell Glacier from 1910 to 2017.

1. According to the article, what is causing the glaciers of Glacier National Park to melt?

2. When will the glaciers of Glacier National Park be gone? What might affect this date?

Experiment:

To understand this phenomenon you will use a PhET simulation and an [investigation plan](#) developed by Amy Rouinfar (a Middle School Earth Science Teacher). Turn to the next page and follow Ms. Rouinfar's directions.



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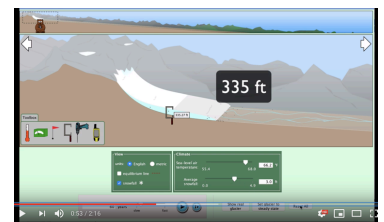
Experiment: Glaciers

3. Open up the PhET Glaciers simulation (<http://phet.colorado.edu/en/simulation/glaciers>) and play with the sim for five minutes. What **phenomenon** will you be investigating?

What is the **purpose** of this investigation?

4. Observe what happens to the glacier as you adjust different parameters in the simulation. Record your observations in the table below.

If you are unable to use the simulation you can gather evidence from [this video](#) [instead](#).



Action	Glacier Movement	Maximum Thickness
<i>Trial 1</i> Decrease the average annual snowfall	<input type="checkbox"/> Advances <input type="checkbox"/> Retreats <input type="checkbox"/> None	<input type="checkbox"/> Increases <input type="checkbox"/> Decreases <input type="checkbox"/> No Change
<i>Trial 2</i> Increase the average annual snowfall	<input type="checkbox"/> Advances <input type="checkbox"/> Retreats <input type="checkbox"/> None	<input type="checkbox"/> Increases <input type="checkbox"/> Decreases <input type="checkbox"/> No Change
<i>Trial 3</i> Decrease the air temperature	<input type="checkbox"/> Advances <input type="checkbox"/> Retreats <input type="checkbox"/> None	<input type="checkbox"/> Increases <input type="checkbox"/> Decreases <input type="checkbox"/> No Change
<i>Trial 4</i> Increase the air temperature	<input type="checkbox"/> Advances <input type="checkbox"/> Retreats <input type="checkbox"/> None	<input type="checkbox"/> Increases <input type="checkbox"/> Decreases <input type="checkbox"/> No Change



5. Identify the variables in the simulation in the table below.

Trials	Experimental Variable (Cause)	Measured Variables (Effect)	Controlled Variables (at least three)
Trials 1 and 2			
Trials 3 and 4			

6. All investigations and simulations have limitations. What might you add to this simulation or investigation to more accurately predict what might happen to the glaciers of Glacier National Park?

