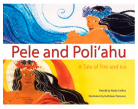
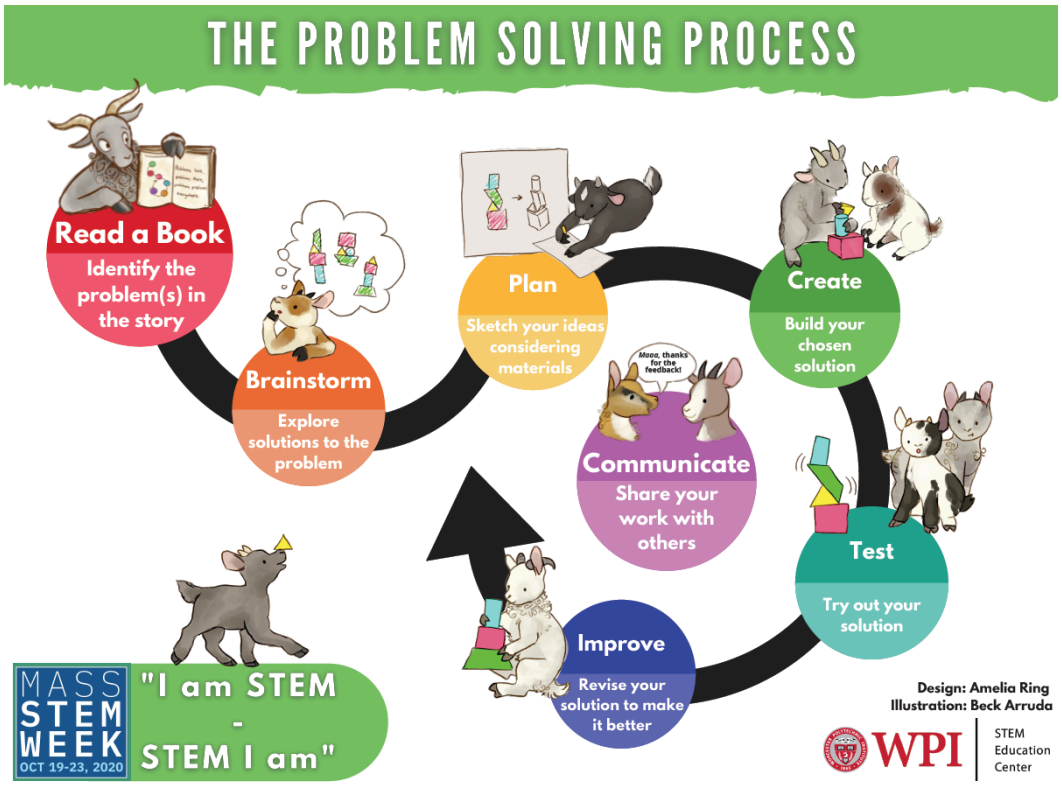
I am STEM: STEM Week Lesson

Written by: Sara Donovan

Selected Book	**Title: Pele and Poli'ahu** **Written by: Retold by Malia Collins** **Illustrated by: Kathleen Peterson** 		
Grade	7	Read-Aloud Link	*https://www.youtube.com/watch?v=q7XpovRz47g*
Challenge Overview:	Pele and Poli'ahu is a folklore story that explained volcanic eruptions as a battle between these two goddesses. This story helped the Hawaiian people make sense of their world through their culture. Nowadays, the location and occurrence of volcanoes and earthquakes can be explained scientifically by analyzing patterns of data. Your group is being hired by Alpha Action Productions (a movie company) to research a possible filming location for a new action movie. You must research and communicate patterns of scientific evidence that help forecast the likelihood of earthquakes and/or volcanic eruptions in given filming locations.		
Note	This lesson addresses standards from the 2016 Massachusetts Digital Literacy and Computer Science (DLCS) Curriculum Framework, which includes four domains: computing and society, digital tools and collaboration, computing systems, and computational thinking. For more information about the standards, visit the DLCS website created by the MA Department of Elementary and Secondary Education. *Pele and Poli'ahu* focuses on standards from the **digital tools and collaboration domain** and requires a device (a Chromebook, computer or tablet) with Internet access, a spreadsheet app, and the ability to run Google Maps. Students will create a presentation with a data table and map to explain why their location is the best place to film.		



	Monday	Tuesday	Wednesday	Thursday	Friday
STEM/ Problem Solving	Read the book. **Identify the problem(s)** in the story. Define criteria and constraints. **Brainstorm** possible solutions.	**Plan** your solution: Sketch your ideas. Gather and explore materials. **Share** your work.	**Create** your chosen solution. **Share** your work.	**Test** your solution. **Share** and obtain feedback. **Improve** your solution.	**Communicate** your revised solution to an audience.

STE, Math, DLCS, and ELA Practices

STE	Math
✓ **Asking questions and defining problems** ✓ Developing and using models ✓ Planning and carrying out investigations ✓ **Analyzing and interpreting data** ✓ Using mathematics and computational	✓ Make sense of problems and persevere in solving them ✓ Reason abstractly and quantitatively ✓ Construct viable arguments and critique the reasoning of others

thinking ✓ Constructing explanations and designing solutions ✓ **Engaging in argument from evidence** ✓ **Obtaining, evaluating, and communicating information**	✓ Model with mathematics ✓ Use appropriate tools strategically ✓ Attend to precision ✓ Look for and make use of structure ✓ Look for and express regularity in repeated reasoning
ELA	**Computer Science (DLCS)**
✓ **Demonstrate independence** ✓ Build strong content knowledge ✓ **Respond to the varying demands of the audience, task, purpose and discipline** ✓ **Comprehend as well as critique** ✓ Value evidence ✓ **Use technology and digital media strategically and capably** ✓ **Come to understanding other perspective and cultures**	✓ **Creating computational artifacts** ✓ Connecting computing concepts ✓ Abstracting to develop models and manage information ✓ **Analyzing computational artifacts created by themselves and others** ✓ **Communicating clearly, accurately, and responsibly** ✓ **Collaborating with others** ✓ **Researching**

Culturally & Linguistically Sustaining Practices (CLSP)

- ❏ Connect the content of the book to your students' cultural and linguistic backgrounds.
- ❏ **Ask relevant and inclusive questions that connect to all students from various backgrounds (i.e. Asking what kind of instruments and music they like or hear in their homes, rather than what instruments they play).**
- ❏ Ask students to make connections to the problems in the stories by relating them to their home and community experiences.
- ❏ **Encourage students to express and communicate their knowledge and ideas using multiple modes and modalities (i.e. writing, drawing, speaking, etc…), including students' home language.**
- ❏ **Select materials and tools that are developmentally appropriate, culturally accepted and easily available for all students.**
- ❏ **Give students plenty of opportunities to discuss and share various stages and possibilities of the design.**
- ❏ When possible, assist students in group work by providing them clear and fluid roles.
- ❏ Scaffold students' learning using their family and home funds of knowledge (i.e. connect the students' family/community expertise to inform the problem solving process).

MA STE, Math or Computer Science (DLCS) Standards

STE Standards

7.MS-ESS3-2. Obtain and communicate information on how data from past geologic events are analyzed for patterns and used to forecast the location and likelihood of future catastrophic events.

Clarification Statements:

• Geologic events include earthquakes, volcanic eruptions, floods, and landslides.

• Examples of data typically analyzed can include the locations, magnitudes, and frequencies of the natural hazards.

DLCS Standards

Research 6-8.DTC.c 4. Create an artifact, individually and collaboratively, that answers a research question and communicates results and conclusions.

Learning Targets:	Student will be able to ● Obtain information of locations, magnitudes, and frequencies of past earthquakes and volcanic eruptions ● Communicate how patterns of the data can be used to forecast likelihood of future geologic events ● Create a digital artifact that communicates the research and conclusion

MA ELA Standards

Presentation of Knowledge and Ideas

5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points

ELA Learning Targets:	Students will be able to ● Use a multimedia component to clarify their findings and emphasize important data points

Key Vocabulary Words

Tier 1	Tier 2	Tier 3
Cloaks Mischief Lava Maiden Barreling	Goddesses Snowcapped Archenemy Magnitude	Koa Haku lei Ohi'a lehua tree

Volcano Earthquake		
CLSP Strategies	• Connect the content of the book to your students' cultural and linguistic backgrounds. • Encourage students to express and communicate their knowledge and ideas using multiple modes and modalities (i.e. writing, drawing, speaking, etc…), including students' home language.	

Materials

G7 Caregiver letter: Pele and Poli'ahu
G7 EDP Rubric: Pele and Poli'ahu

Lesson Handouts
G7 Earthquake/Volanco Data
G7 Earthquake/Volcano Presentation
G7 Entering Data in a Spreadsheet.webm
G7 Group Research Sheet
G7 Intro Letter from Alpha Action Productions
G7 Making A Table in Google Sheets.webm
G7 Using Google My Maps.webm
G7 WPI EDP 1

Online Resources
Pele & Poli'ahu
volcanodiscovery.com
volcanoesandearthquakes.com
earthquaketrack.com
Concord Consortium Seismic Explorer
https://people.howstuffworks.com/9-legends-of-american-folklore.htm#:~:text=American%20folklore%20is%20rich%20with,blending%20history%2C%20myth%20and%20imagination.
https://helpfulprofessor.com/folklore-examples/
https://mgs.geo.umass.edu/resources/earthquakes
Google Sheets or spreadsheet program
Google Maps

Hands-on Materials
- Hardware: computer or Chromebook with Internet access
- Software:
  - Spreadsheet (Google Sheets, Excel, etc.)
  - Presentation tool (Google Slides, PowerPoint, Canva, etc.)

○ Google My Maps, available on the web at https://www.google.com/maps/d/ (note: there is no app for creating My Maps on a mobile device) ● Various websites for data research, examples below ○ volcanodiscovery.com ○ volcanoesandearthquakes.com ○ earthquaketrack.com ○ Concord Consortium Seismic Explorer	
CLSP Strategies	● Select materials and tools developmentally and culturally appropriate/available for all students.

Monday	
Teacher Preparation:	• Copy and distribute Caregiver Letter G7 Caregiver letter: Pele and Poli'ahu • Lesson Rubric G7 EDP Rubric: Pele and Poli'ahu • If needed, gain background on various examples of folklore: American Folklore, 101 Folklore Examples • Copy or post to Google Classroom: Letter from movie production company
Student Preparation:	n/a
Problem Solving:	• Read the book. • **Identify the problem(s)** in the story. • Define criteria and constraints. • **Brainstorm** possible solutions
Practice(s) of the Day	STE: Asking questions and defining problems ELA: Come to understanding other perspective and cultures
CLSP Strategies	• Connect the content of the book to your students' cultural and linguistic backgrounds. • Ask relevant and inclusive questions that connect to all students from various backgrounds (e.g. Asking what kind of instruments and music they like or hear in their homes, rather than what instruments they play). • Connect the problems in the stories to all students' home and community experiences. • Scaffold students' learning using their family and home funds of knowledge (e.g. connect the problem to the students' family/community expertise).

Activity (Duration)	Instructions	Product
Building background (5-7 minutes)	Invite student to share folklore of their culture *--Folklore is a traditional story of a community or culture that is passed down through generations.* *--What types of folklore do you know from your culture or another culture? (see link in teacher prep for examples if needed)* *--We are going to read a story about how the island of Hawaii was formed by the Hawaiian goddess Pele. Listen for examples of how the story helped the Hawaiian culture make sense of the world around them and how it is the*	Class discussion

	same or different from scientific knowledge you have about volcanoes.	
Read aloud (10 minutes)	Read aloud Pele and Poli'ahu	
Introduce Problem, Criteria, and Constraints (5-7 minutes)	**State the problem of the story**: The beautiful folklore of Pele and Poli'ahu is a cultural explanation of volcanic eruptions but does not include scientific evidence or data of eruptions. **Problem to be solved**: Your group is being hired by Alpha Action Productions (a movie production company) to research a possible filming location for a new action movie. You must research and clearly communicate data of past and recent earthquakes and/or volcanic eruptions and explain how this data could be used to forecast the likelihood of future geological events in the location. You can use this letter from movie production company as a fun way to introduce the project to the students. State the criteria: Each group will ● Create a spreadsheet that organizes data (date, location, geographical event, magnitude) of geologic events in your location. Data will include 7-10 recent events and 1-2 of the largest events recorded in the location. ● Research why these events occur in this area. (ring of fire, types of tectonic plate movement, etc) ● Communicate findings on a shared Google Slideshow ● Pin location on a shared Google My Maps and include a picture and a conclusion of your findings for Alpha Action Productions. State the constraint: ● Students must choose from given locations	

Tuesday	
Teacher Preparation:	EDP: Post in classroom and in Google Classroom Group research sheet: edit as needed and print for each group
Student Preparation:	Chromebook, pencil
Problem Solving:	**Plan** your solution: ● Sketch your ideas ● Gather and explore materials. ● Share your work
Practice(s) of the Day	STE: Obtaining, evaluating, and communicating information ELA: Demonstrate independence, respond to the varying demands of the audience, task, purpose and discipline DCLS: Collaborating with others. researching
CLSP Strategies	● Encourage students to express and communicate their knowledge and ideas using multiple modes and modalities, including students' home language. ● Give students plenty of opportunities to discuss and share various stages and possibilities of the design. ● Assist students in group work by providing them clear and fluid roles, whenever possible.

Activity (Duration)	Instructions	Product
Engineering Design Process (5 minutes)	• Share/post the EDP poster • Explain that although the building/creating will result in a digital product instead of a physical product, the EDP is still used to guide the learning process and digital product development.	Class discussion

Research (30 minutes)	• Students will work in small groups and will be assigned one location to research. Some suggested locations are Iceland, Japan, Indonesia, New Zealand, and Mexico. Choose others as needed.
	• Students will research geological events (earthquakes/volcanoes) in their given location and record on their Group research sheet.
	  ○ 7-10 past and current geologic events
	  ○ 1-2 historic (largest/famous/most destructive) volcanoes/earthquakes in the location
	  ○ Scientific reason why these events occur in this location
		Draft research sheet

Check in/share (5-7 minutes)	• Each group does a 60 second shout out of their location and what they found from their research	Verbal formative assessment

Wednesday	

Teacher Preparation:	• Watch the **tutorials** (if needed)
	  ○ Entering Data to a Spreadsheet (video)
	  ○ Making a Table in Google Sheets (video)
	• **Google Sheet Template** (edit as needed) Post on Google Classroom with editing preferences for "students can edit".
	• **Google Slideshow** (copy and edit as needed) Post on Google Classroom with editing preferences for "students can edit".

Student Preparation:	• Completed Group Research Sheet from yesterday • Chromebook
Problem Solving:	• **Create** your chosen solution. • Share your work.
Practice(s) of the Day	STE: Asking questions and defining problems; analyzing and interpreting data; engaging in argument from evidence; obtaining, evaluating, and communicating information ELA: Build strong content knowledge; respond to the varying demands of the audience, task, purpose and discipline; use technology and digital media strategically and capably DCLS: Creating computational artifacts; communicating clearly, accurately, and responsibly; collaborating with others
CLSP Strategies	• Encourage students to express and communicate their knowledge and ideas using multiple modes and modalities, including students' home language. • Give students plenty of opportunities to discuss and share various stages and possibilities of the design. • Assist students in group work by providing them clear and fluid roles, whenever possible.

Activity (Duration)	Instructions	Product
EDP Check In (5 minutes)	• Review the EDP and discuss today's goal of the creation of the digital project	
Communicating Data (30 minutes)	Students will be creating digital artifacts to communicate their research and data to Alpha Action Productions. Each group will: • Add data from yesterday's Group Research Sheet to their tab/sheet on the shared Google Sheet. • Create a table of their Google Sheet data and copy/paste the table to their Google Slide • Edit and add their scientific explanation from their Group Research Sheet to their Google Slide The following tutorials can be used for anyone who needs support with a digital task. • Entering Data to a Spreadsheet (video) • Making a Table in Google Sheets (video)	Location spreadsheet, Google Slide

Thursday	
Teacher Preparation:	Create and share a Google My Map with the class (**tutorial**) Add the link to the shared Google My Map to the shared slideshow.
Student Preparation:	Pencil, chromebook **Tutorial** on Google My Maps (if needed)
Problem Solving:	• **Test** your solution. • Share and obtain feedback. • **Improve** your solution.
Practice(s) of the Day	STE: Analyzing and interpreting data, obtaining, evaluating, and communicating information ELA: Respond to the varying demands of the audience, task, purpose and discipline, comprehend as well as critique, use technology and digital media strategically and capably DLCS: Analyzing computational artifacts created by themselves and others; communicating clearly, accurately, and responsibly;collaborating with others
CLSP Strategies	• Encourage students to express and communicate their knowledge and ideas using multiple modes and modalities, including students' home language. • Give students plenty of opportunities to discuss and share various stages and possibilities of the design. • Assist students in group work by providing them clear and fluid roles, whenever possible.

Activity (Duration)	Instructions	Product
Peer Feedback (10 minutes)	● Each group will thoroughly review and critique another group's slide and give feedback on the data table, the scientific explanation, and overall design of the presentation slide.	
Revision (15 minutes)	● Each group will revise their work based on peer feedback.	Revised slideshow
Revised Communication (15 minutes)	● After thoughtful final changes are made on the Google Slideshow, groups will… ○ Go to the shared Google My Maps link ○ Pin their location (see tutorial if needed) ○ Add a picture to the pin ○ Paste final draft of their scientific explanation to the pin	Finalized Google Map

Friday	
Teacher Preparation:	• Lesson Rubric - G7 EDP Rubric: Pele and Poli'ahu • Invite a special guest to join the class in person or virtually. Suggestions: local geological society (example: Massachusetts Geological Survey), high school geology or earth science class, 4th grade class (4th grade has standards on earthquakes/volcanoes) • Prepare for a virtual or in person guest. Be mindful of any student privacy issues and/or district policies.
Student Preparation:	• Make sure slideshow and Google Map are finalized • Optional: Create a fun way to convince Alpha Action Productions that your location is the best for the new movie (song, dance, poster, etc.)
Problem Solving:	• **Communicate** your revised solution to an audience.
Practice(s) of the Day	STE: Engaging in argument from evidence, obtaining, evaluating, and communicating information ELA: Respond to the varying demands of the audience, task, purpose and discipline, use technology and digital media strategically and capably DLCS: Communicating clearly, accurately, and responsibly
CLSP Strategies	• Ask relevant and inclusive questions that connect to all students from various backgrounds. • Encourage students to express and communicate their knowledge and ideas using multiple modes and modalities, including students' home language. • Give students plenty of opportunities to discuss and share various stages and possibilities of the design.

Activity (Duration)	Instructions	Product
I do STEM when… (5 minutes)	● Each group will add a response to the “I do STEM when...” slide at the end of the project to explain how they used STEM skills in this project ● Optional: Teacher can add pictures to the slide of students working throughout the week.	Final slide of slideshow
Share their solutions with a special guest (45 minutes)	● Introduce the special guest to the class ● Each group will share their research, data, and scientific explanation, and how this information could be used to forecast the possibility of a future geologic event in the location. (Be sure to emphasize this connection to the standard!) ● Optional: Each group could create a skit, song, video to convince the Alpha Action Productions why their location is the best and share this with the guest speaker. ● Optional: Special guest could vote on where AAP should film their next movie based on the research and scientific explanations that were presented	Presentation of revised solutions Students’ work on “I do STEM when…”
Family connection	Optional: Share the slideshow with families via class website or newsletter	Optional sharing of slideshow

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Optional Extension Activities

- Students could research an additional location of their own choosing.

- This lesson scaffolded the creation of the spreadsheet by providing the organization of columns and titles. An optional extension would be to have students create their own spreadsheets and use that exercise to discuss the pros/cons of how each group chose to organize/communicate their data on the spreadsheet.

- Reach out to local movie production companies about how they research location options and/or about STEM careers at their companies. Massachusetts Film Production Companies

- Each group could create a video to convince Alpha Action Productions to use their location.
- Students could link or embed the video on their slide and/or the Google Map.