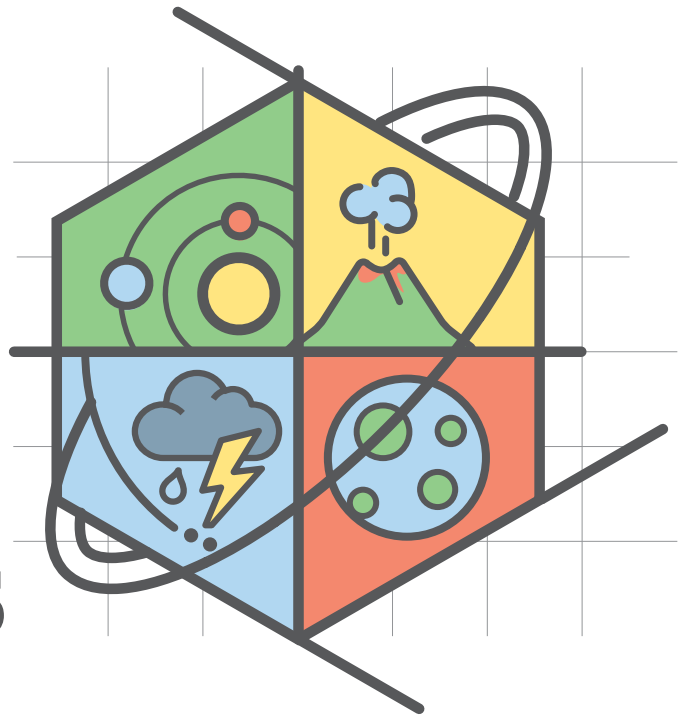


# Climate, Weather, and Ways We Shelter



*3rd Grade Integrated STEM Storyline*



**STEM**

7.7.22

## ABOUT THIS UNIT

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In this 3rd grade integrated STEM Storyline focused around the topics of climate and weather, we present students with the challenge of designing and building prototype temporary shelters for people in need. The unit launches with a discussion about the importance of shelter for humans. Then, students explore the significance of local weather conditions, the local climate, and how these may affect us. Students continue by exploring climate conditions around the world and how people have designed housing that shelters them from daily weather and climate. This unit culminates with students engaging in a design thinking process (similar to engineering design) where they design and test a shelter for people to use.

This unit also contains links to online resources created by other organizations which may use a different license. Please make sure that you understand the terms of use of third-party resources before reusing them. Prior to publishing this unit of study, we have reviewed the content of this unit to ensure that all materials are in accordance with creative commons regulations. If you notice that a part of this unit infringes another's copyright, please contact us.

If you have feedback, questions, or would like to connect, please email Pranjali Upadhyay at [pranjali.upadhyay@esd112.org](mailto:pranjali.upadhyay@esd112.org).



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A digital copy of this document is available on the STEM Materials Center website at: <https://www.stemmaterials.org/Climate-Weather-Shelter>

## ATTRIBUTION

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This unit is a result of a collaborative effort between Educational Service District 112 and educators and specialists from other school districts and agencies.

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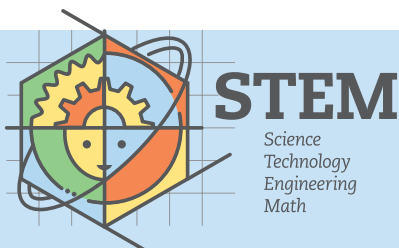
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OSPI

CLIME  
TIME  
CLIMATE SCIENCE LEARNING



# UNIT OVERVIEW

Please note that these lessons, activities, and resources are intended to be a support for you. Each session is designed to be approximately 30-45 minutes long. We encourage you to adapt, revise, and extend these activities in ways that are meaningful and in ways that serve the needs of the learners in your classroom. Feel free to add and connect this content with topics and resources that you and your students find relevant, meaningful, and exciting. Also, feel free to connect with other curricula you use (ELA, Math, Social Studies, Computer Science, etc.) to create an authentic and integrated learning experience for the students you serve.



Please use this unit overview to aid in your planning. All the teacher support materials (slides, handouts, etc.) are located in this google drive: <https://bit.ly/weatherandshelter>. Please feel free to comment on documents on the drive if you notice errors that need to be fixed. It is recommended that you make a copy of the google drive materials onto your own drive account so you can edit and adapt as you wish. To do this, click "file" and "make a copy."

## LESSON 1: Weather & Shelter

pg. 6

In this lesson, students are introduced to the driving question of the unit, "How can we create a prototype for a temporary home that can be used by people?" Students start thinking about why it is important to have a home and start thinking about what they need to know in order to complete the project. Students also read the story of Imarvaluk, a Iñupiat girl who's family is faced with a serious struggle relating to finding shelter.

Session	Materials Needed	Page
1. Homes	<ul style="list-style-type: none"><li><a href="#">Teacher slides</a></li><li><a href="#">"What does my home look like?" template</a></li></ul> <ul style="list-style-type: none"><li>Chart paper, markers</li></ul>	7
2. Imarvaluk and the wounded island	<ul style="list-style-type: none"><li><a href="#">Teacher slides</a></li></ul> <ul style="list-style-type: none"><li><i>My Wounded Island</i> by Jacques Pasquet and Marion Arbona</li></ul>	8
Homelessness (optional)	<ul style="list-style-type: none"><li><a href="#">Teacher slides</a></li></ul>	9



# UNIT OVERVIEW (cont.)

## LESSON 2: Weather in the Pacific Northwest

pg. 10

In this lesson, students will explore how weather is experienced in their local environment. They will use probes to collect weather-related information and will create graphs to display their findings. They will reconnect with the driving question and think about how people in the PNW create shelter from the weather that we experience in this region.

Session	Materials Needed	Page
1. Outdoor STEM: Weather senses activity	<ul style="list-style-type: none"> <li><a href="#">Weather and Senses template</a></li> <li>Outdoor space to explore</li> </ul>	11
2. Weather data collection (ongoing)	<ul style="list-style-type: none"> <li>Vernier Probes (Temperature, Anemometer, and humidity sensor)</li> <li>Go-link connector</li> <li><a href="#">Data Collection Table for Expert Groups</a></li> </ul>	12
Heat and pressure (optional)	<ul style="list-style-type: none"> <li>Computers with internet access for simulation</li> <li><a href="#">Teacher slides</a></li> </ul>	13
3-4. Graphing our weather data	<ul style="list-style-type: none"> <li><a href="#">Teacher slides</a></li> <li><a href="#">Graphing our Weather Data Activity</a></li> <li>Rulers</li> <li>Colored pencils</li> </ul>	14
5. Connecting with the driving question	<ul style="list-style-type: none"> <li><a href="#">Teacher slides</a></li> <li><i>Recess at 20 Below</i> by Cindy Lou Aillaud</li> <li><a href="#">Brainstorming a shelter for the PNW</a></li> <li>Colored pencils</li> </ul>	15

## LESSON 3: Climates and Shelter Around the World

pg. 16

In this lesson, will explore the climate in the Pacific Northwest. They will also engage in several activities where they explore climate around the world. Through collaboration, they will share their learning about different climates around the world and also the traditional and indigenous housing that people build to shelter in different climates.

Session	Materials Needed	Page
1. The Pacific Northwest	<ul style="list-style-type: none"> <li><a href="#">Teacher Slides</a></li> <li><a href="#">PNW is my Happy Place</a></li> <li><a href="#">National Geographic Kids: Temperate Forest</a></li> </ul>	17
2-3. Our class travels the world!	<ul style="list-style-type: none"> <li><a href="#">Teacher Slides</a></li> <li>Cardstock, colored pencils</li> <li><a href="#">(Optional) Postcard Template</a></li> </ul>	18
4. How do people shelter in different parts of the world?	<ul style="list-style-type: none"> <li><a href="#">Teacher Slides</a></li> <li><a href="#">Traditional Housing Research</a></li> <li>Chart paper or large paper (1 per team)</li> <li>Colored pencils</li> </ul>	19



# UNIT OVERVIEW (cont.)

## LESSON 4: Extreme Weather

pg. 20

In this lesson, students will extend their understanding of how weather impacts people by studying different types of extreme weather. Students will work in expert groups to learn about one type of extreme weather. They will also brainstorm ways that people can shelter extreme weather. As a community, the class will build an understanding of different types of weather and how we shelter from it.

Session	Materials Needed	Page
1. Extreme weather research	<ul style="list-style-type: none"> <li>• <a href="#">Teacher slides</a></li> <li>• <a href="#">Extreme Weather Expert Groups sheet</a></li> <li>• <a href="#">"10 Freaky Forces of Nature"</a></li> </ul>	<ul style="list-style-type: none"> <li>• Chart paper or computers for teams to make slideshow</li> </ul> <p>21</p>
2. Extreme weather presentations	<ul style="list-style-type: none"> <li>• <a href="#">Teacher slides</a></li> <li>• <a href="#">Extreme Weather Expert Groups sheet</a></li> </ul>	<ul style="list-style-type: none"> <li>• Chart paper or computers for teams to make slideshow</li> </ul> <p>22</p>

## LESSON 5: Creating Prototypes of Temporary Shelters

pg. 23

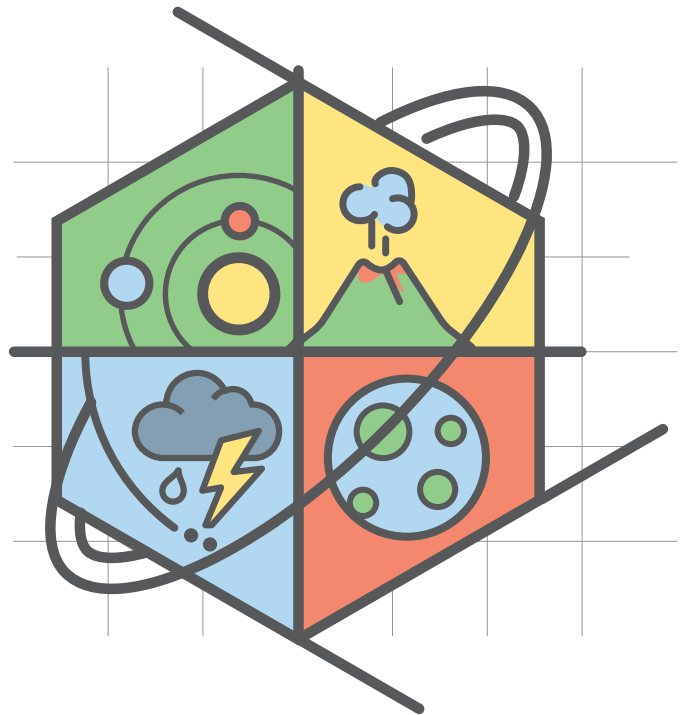
This is the final lesson in this unit and will engage students in the Design Thinking process. Students will empathize with people facing the problem of housing instability. They will think about sheltering problems caused by extreme weather conditions and will ideate, build, and test their prototype. The finale of the lesson and unit is a community showcase where students will be able to share their temporary housing prototypes with members of their community.

Session	Materials Needed	Page
1. Empathy	<ul style="list-style-type: none"> <li>• <a href="#">Teacher slides</a></li> <li>• <a href="#">Design Thinking Notebook</a></li> </ul>	24
2. Defining the problem & ideating	<ul style="list-style-type: none"> <li>• <a href="#">Teacher slides</a></li> <li>• <a href="#">Design Thinking Notebook</a></li> </ul>	25
3. Refining ideation	<ul style="list-style-type: none"> <li>• <a href="#">Teacher slides</a></li> <li>• <a href="#">Design Thinking Notebook</a></li> </ul>	26
4-5. Prototype (building sessions)	<ul style="list-style-type: none"> <li>• <a href="#">Teacher slides</a></li> <li>• <a href="#">Design Thinking Notebook</a></li> </ul>	<ul style="list-style-type: none"> <li>• Construction materials (see lesson for full list)</li> </ul> <p>27</p>
6. Testing (optional)	<ul style="list-style-type: none"> <li>• <a href="#">Teacher slides</a></li> <li>• <a href="#">Design Thinking Notebook</a></li> </ul>	<ul style="list-style-type: none"> <li>• Testing materials (see lesson for full list)</li> </ul> <p>28</p>
Finale! Students share their designs with their community	<ul style="list-style-type: none"> <li>• <a href="#">Design Thinking Notebook</a></li> <li>• <a href="#">Slides from Session 1</a></li> </ul>	<ul style="list-style-type: none"> <li>• Team's prototypes</li> <li>• Other posters and work that students have completed throughout the unit</li> </ul> <p>29</p>



# LESSON 1: Weather & Shelter

## STRATEGY: ENGAGE



In this lesson, students are introduced to the driving question of the unit, ***“How can we create a prototype for a temporary home that can be used by people?”*** Students start thinking about why it is important to have a home and start thinking about what they need to know in order to complete the project. Students also read the story of Imarvaluk, a Iñupiat girl who’s family is faced with a serious struggle when her island gets threatened by rising sea levels.



# SESSION 1:

## Homes

### Warm-up

Start the project by asking students, “what does your home look like?” Give students time to work on their [thinking templates](#) to create a drawing of their home. Be sure to ask students to draw things that they like about their home. Please be aware of the diverse socio-economic backgrounds of the families that you serve. If you have students who are homeless, you might want to adjust the prompt to ask “What does home feel like to you?” This way, students may be able to focus on other aspects of home (ex. A warm meal, all my toys, loved ones, etc.) instead of the actual structure of home.

### Main activity

Once students have had a chance to work individually, have students join teams and work with their team to answer the question: How do our homes keep us safe? They can make a list or make a diagram to share their thoughts. Once teams have at least 5-8 minutes to brainstorm, pair each team with another team and have them share ideas. What did their teams talk about and what did their ideas have in common? What ideas were different?

**\*Equity Strategy:** Create opportunities for students to share their thinking and voice their ideas. In addition, create space for students to connect on similar points of thinking and to also appreciate when there are diverging ideas in a group. Diversity of thought and perspective is an asset in the classroom and can be used to help students think more deeply about ideas and problems.

**Whole group consensus:** Have students share their teams’ ideas with the whole group. Take notes on the overall ideas that were generated by the group. Show students some images of houses and homes around the world. Ask them to share their observations and ideas related to each image. It might be helpful to have students talk to a partner about what they observe.

 **Present students with the driving question of the unit: How can we create a prototype for a temporary home that can be used by people?**

**Ask students:** What are some things that you need to know in order to design a home for people who need it? Create a need-to-know chat where you can list their questions about the topic. This need-to-know chart can be accessed throughout the unit to see if students’ inquiry points are being addressed.

**Ask students:** What are some things that you already know about our driving question? Do you have ideas or experiences that can help you think about creating a shelter for people? Thank students for sharing their valuable thoughts and experiences.

### Materials Needed

[Teacher slides](#)

[“What does my home look like?” template](#)

Chart paper, markers



# SESSION 2:

## Imarvaluk and the wounded island

### Warm-up

Introduce the book, *My Wounded Island* by Jacques Pasquet and Marion Arbona to students. This is a book about a child named Imarvaluk, and she talks about her and her people's struggles with finding shelter while the climate around their island is changing.

### Main activity

As you read the book you can ask the following questions:

- How has the weather or climate changed to make life more dangerous for Imarvaluk and her people?
- What kind of houses did Imarvaluk's people, the Iñupiat live before and how have they changed the way they shelter?
- How do Imarvaluk's father and grandfather help their family shelter when they hunt caribou and gather fish and berries during the summer?
- What is the invisible creature Imarvaluk is talking about? Why is she scared of it?
- What is happening to her island?
- How have the changing winters changed the pack ice?
- What has caused this tragedy?
- Why are glaciers melting and causing the sea to rise?
- What will happen to Imarvaluk's home and why?
- What will Imarvaluk's people have to do to survive?
- Why does her grandfather not want to move?

### Wrap-up

Ask students to think about Imarvaluk's problems and worries. Why is it important for her and her family to have shelter? What are some of the challenges that they are facing? Are there other people in our country and in the world who face similar challenges? What are some challenges faced by other people who do not have shelter?

### Materials Needed

*My Wounded Island* by Jacques Pasquet and Marion Arbona

Tables for student research

[Teacher slides](#)





# SESSION 3: Homelessness

## (OPTIONAL EXTENSION SESSION & PROJECT FOCUS)

### Main activity

The driving question of this project can connect directly to help students think about the problem of homelessness that many people face. If you feel that this is a topic that would be appropriate for your students, please consider presenting it as a focus for the unit. In this case, students would be thinking about how they can create a prototype temporary home for houseless individuals to protect them. If this is a topic that you find inappropriate for your student group or you feel uncomfortable teaching, please have students simply think about sheltering from weather or climate-related hazards.

Explain to students that while we can agree that home is an important thing for many of us, that many people don't have homes for a variety of reasons. Show students the read-aloud of the book, "Home in the Woods" by Eliza Wheeler. It is a story about a homeless family who found a hut in the woods and renovated it to become their home. The text is introduced here in order to help students develop empathy and understanding towards the struggle of this family and to celebrate their resourcefulness. Here are some discussion questions to prompt student thinking around this text,

- What was this family going through?
- What did they find in the woods?
- How did they turn the abandoned place into their home?
- What thoughts or questions do you have?

In the teacher slides, we have linked read-alouds to several other texts that can be used if your students would like to explore this topic more.

### Wrap-up

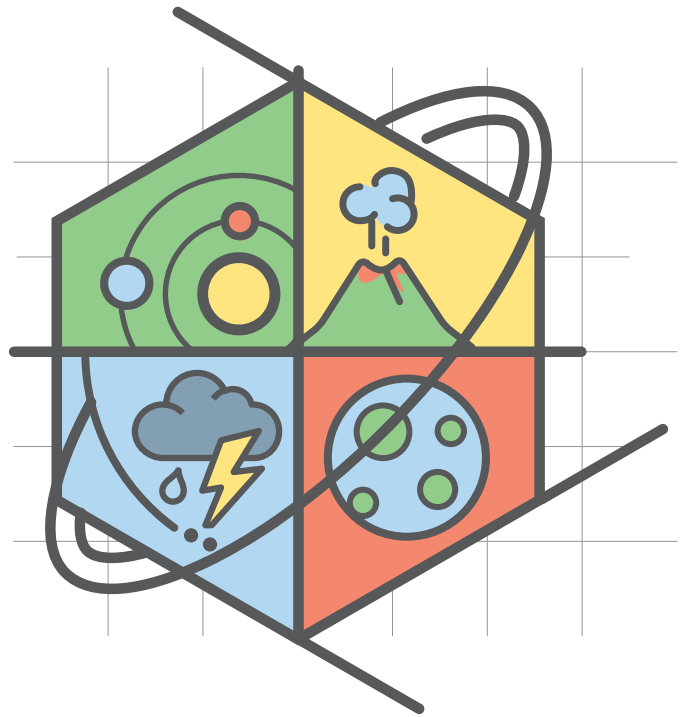
Ask students to recap how these texts made them feel and what they made them think? Why is having a home important to us? Have they seen people locally or on a trip who didn't have a house to live in? Encourage students to share their experiences and thank them for their contributions to this learning community.

### Materials Needed

[Teacher slides](#)



# LESSON 2: Weather in the Pacific Northwest



## STRATEGY: ENGAGE

In this lesson, students will explore how weather is experienced in their local environment. They will use probes to collect weather-related information and will create graphs to display their findings. They will reconnect with the driving question and think about how people in the PNW create shelter from the weather that we experience in this region.



# SESSION 1:

## Outdoor STEM: Weather senses activity

### Main activity

Take students on a walk outside. If possible, allow students to sit outdoors with their [Weather and Senses template](#). What are ways that they can see, hear, smell, and feel weather? Give students a few minutes to soak in their surroundings. You can suggest that they close their eyes to better focus on hearing. You can suggest that they close their eyes and take a deep breath to sense the smell. They can close their eyes to sense touch. Then, have students reflect on their favorite kind of weather and write a small journal entry.

### Wrap-up

Encourage students to share their responses. What are ways that they sense weather? How does weather change during the seasons? Tell students that we will be collecting information about the weather everyday for a few weeks to see if we notice any patterns or changes in the weather.

### Materials Needed

[Weather and Senses template](#)

Outdoor space to explore



# SESSION 2 (AND ONGOING): Weather data collection

*Teacher Prep Information: The STEM kit includes some technology that will help you to measure certain aspects of weather. The vernier probes are a great way for students to accurately measure different aspects of weather. Please check out this slideshow if you need some support connecting your probes to a computer to start generating some data.*

- **Temperature sensor:** measures temperature, or hot or cold the air is.
- **Anemometer:** measures the speed of the wind, or how fast the wind is going.
- **Humidity Sensor:** measures how humid the air is.
  - » **Humidity** is the amount of water vapor in the air. Air can be drier or more humid.

## Warm-up

Start by asking students “What are some experiences you have around weather? What do you think weather is?” Encourage students to share with a partner and then ask the whole group to share their ideas. Provide time for student voice to thrive before moving on. Then, ask students to look at data about the weather from around the world. What do they notice about the weather conditions around the world? **Weather** is the day-to-day conditions in our environment.

## Main activity

Encourage students to join an “expert group” that will collect a certain type of data to help us better understand the weather. Different groups can focus on collecting one bit of data, ex. Temperature, wind speed, or humidity. This data collection table can be used to help students organize their data. The last column can be used to make general observations or notes in the form of words or pictures. Try to have a few probes set up so students can easily grab them. It might also be possible (if weather permits) to have the stations ready outside so student teams can go outdoors, make observations and return.

**Meteorologists** and other scientists study patterns in weather, and patterns in how weather and seasons are changing over the years. This helps us to keep informed on how to prepare for the weather and to stay safe.

If you are staggering student groups’ data collection, groups that are indoors can work on the “Scientist’s Journal” page behind the data table. Encourage them to think about how the living parts of the environment respond to different weather. Life sciences and Earth Science are closely connected. What happens to plants and animals when the weather changes?

## Wrap-up (5-10 min)

Thank students for their hard work in collecting data and let them know that you will continue collecting data for several days. Ask students to share what they wrote on their reflection page. How does the natural environment respond to changes in weather? How do the plants and animals respond to different types of weather?

### Materials Needed

Vernier Probes  
(Temperature,  
Anemometer, and  
humidity sensor)

Go-link connector

[Data Collection Table for  
Expert Groups](#)



# OPTIONAL SESSION:

## Heat and pressure

### Warm-up

“Today we will explore a simulation that will show us how heat and pressure are related. A simulation is a model that scientists use to understand how things work in nature.”

### Main activity

Share this phet simulation with students. You can have them visit the url on their computers, or show them on your own computer: <https://phet.colorado.edu/en/simulations/states-of-matter-basics>

Click the simulation for “Phase changes”

Here are some questions you can ask students, or students can investigate what happens when variables are changed. For instance:

- What happens to the particles if you add heat?
- What happens to the pressure (pressure meter) if you add more particles?
- What happens to the pressure if you add heat?
- What happens to the temperature if you push the lid down?
- What happens to the pressure if you push the lid down?
- How can we make the pressure higher in this container?

Ask students to think about the relationship between pressure and the temperature, you can give them the following sentence frames to fill out. Encourage them to work with a partner or in small groups to make sense of their observations.

- High pressure leads to \_\_\_\_\_ temperature.
- Lower temperature leads to \_\_\_\_\_ pressure.

### Wrap-up

Have teams share how they finished their sentence frames. Were there any disagreements? What did their teams observe that led them to make their claims?

### Materials Needed

[Teacher slides](#)

Computers with internet access for simulation  
Zip bags



# SESSIONS 3-4:

## Graphing our weather data

### Warm-up

Congratulate students for working so hard to collect meaningful data that we can now use to better understand the weather patterns in our area. Now we will try to turn the numbers we created into a graph. Show students the few examples of graphed weather data as shown in the teacher slides. What information is this graph showing us? Did the weather change over the span of a few days? How did it change? Encourage students to share ideas with a partner and ask them to share their ideas with the whole group. Take this time to allow students to think about why graphs can be helpful.

### Main activity (can be split into two sessions)

**Share the example** graph provided in [the handout](#) and on the teacher slides. Encourage students to work in groups to make sense of the graph. Here are some prompts that will help call students' attention to certain features:

- What is the x-axis (the flat axis) showing?
- What is the y-axis (the axis standing up) showing?
- Why did the person decide to make the y-axis showing numbers counting by the 20's?
- Was it easy for you to get information from this graph?
- Is there anything you would do differently?

**Students use rulers and colored pencils to draft their own graph by working in their teams to think about the following questions:**

1. What information will you put on the x-axis?
  - Go ahead and draft that.
2. What data did you collect (temperature, wind speed, or air pressure)? How will you show it on your y-axis?
  - What number intervals would make the most sense?
3. Be sure to label both of the axes.
4. Make bars to show the data you gathered.

As you circulate the classroom to see how students are making sense of the task, see if students need support with how to create their graph.

### Wrap-up gallery walk or team share

Have students display their graphs around the classroom as teams circulate and take a look at each other's representations. You can also pair teams together and have students explain their graph to a person from a different team. Bring the class together and ask: What did you notice that was similar about your team's graph and others? What was different? What information did we discover as we collected data about the weather? Celebrate students' hard work.

### Materials Needed

[Teacher slides](#)

[Graphing our Weather Data Activity](#)

Rulers

Colored pencils



# SESSION 5:

## Connecting with the driving question

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### Warm-up

Remind students about the driving question of the unit: **How can we create a prototype for a temporary home that can be used by people?** What type of shelter might someone in the PNW need? What are some types of weather that we have in the PNW that someone would need shelter from? You can show students different images of homes in the Pacific Northwest collected on the teacher slides or allow them to look through them in their groups.

**(Optional)** Read *Recess at 20 Below* by Cindy Lou Aillaud. Ask students, how is the winter similar or different from winter in Alaska? Do you also bundle up in the winter? How is the weather during the winter in Alaska? How does it compare with weather here?

### Main activity/team brainstorm

What type of weather conditions do people living in your area need shelter from? With your team, take a look at (or think about the) pictures of houses in the Pacific Northwest. Do people in the Pacific Northwest ever deal with natural hazards? Which ones do you remember? What are some ideas you might want to borrow as you think about the shelter you will plan? Students can draft their ideas in this [thinking template](#).

### Wrap-up

Have teams share some of the ideas that they drafted. What questions do they have? What more do they need to know in order to answer the driving question?

### Materials Needed

[Teacher slides](#)

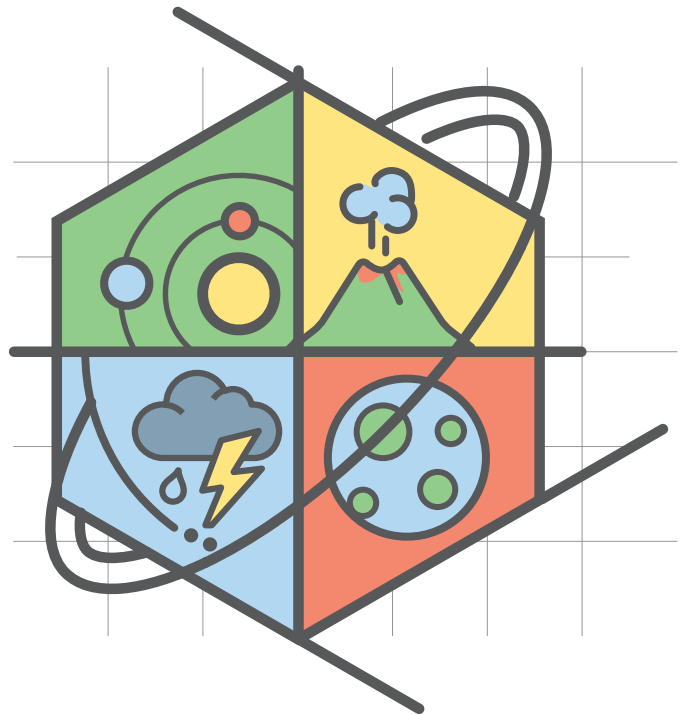
*Recess at 20 Below* by  
Cindy Lou Aillaud

[Brainstorming a shelter for  
the PNW](#)

Colored pencils



# LESSON 3: Climates and Shelter Around the World



## STRATEGY: ENGAGE

In this lesson, will explore the climate in the Pacific Northwest. They will also engage in several activities where they explore climate around the world. Through collaboration, they will share their learning about different climates around the world and also the traditional and indigenous housing that people build to shelter in different climates.





# SESSION 1:

## The Pacific Northwest

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### Warm-up

Ask students to think about: What is weather typically like in the Pacific Northwest? Different places on earth have different patterns of weather. Some places are very hot with little rain all year long. Some places are frozen over most of the year and only get warmer over the summer. Some places are wet, warm, and humid all year long. The general patterns of weather in an area are called its **climate**. Ask students, “What are some types of weather, or patterns of weather that we often have in the Pacific Northwest?”

Show students the video of the temperate forest climate linked in the teacher slides. The Pacific Northwest is categorized as a temperate forest.

### Main activity

Provide students with the [PNW is my Happy Place Template](#) where they can write a journal entry about how they enjoy living in the Pacific Northwest. They can also draw their favorite type of PNW weather. These are some prompts they can think about: What do you love about the beautiful climate where we live? What do you love about our surroundings? Can you imagine yourself in a happy place in nature? On the back of the page, students can also think about weather-related hazards that we often have in this region. You can play nature sounds (in teacher slides) to help students get interested and involved in the activity.

### Wrap-up

Ask students to share their drawings. What do they love about the PNW climate? What do they appreciate about the place that they live? How does their environment make them feel? Do we have any weather-related hazards that we deal with despite the beauty of this region?

### Materials Needed

[Teacher Slides](#)

[PNW is my Happy Place](#)

[National Geographic Kids:  
Temperate Forest](#)



# SESSIONS 2-3:

## Our class travels the world!

### Warm-up

Tell students that for the next few days, we will pretend to be traveling the world! Each team will be assigned a place to visit. After you learn about the climate of the place you are visiting, you will make an imaginary postcard for a friend or family member.

### Main Activity

Have students split up into groups and select a place to travel. You can assign “travel plans” for each group or have them select their location. Teams will then use their computers to watch a video about their climate. They can also use their devices to research more about the city that they are visiting. The [teacher slides](#) for this lesson include QR codes that link to various videos about the different climates.

Students are to:

1. Watch the video on your travel destination’s climate.
2. Research more information about your destination
3. Create a postcard to share with a friend, classmate, or family member.

Students can use sentences and drawings to show the following things: What are the temperatures like during different parts of the year? What does the biome/climate look and feel like? What kinds of plants and animals survive there? Did you enjoy your stay? Why or why not?

### Wrap-up

Ask students to pair-up with a person that traveled to a different location than them. Ask students to share how their trip was. What was the weather like? What is the climate generally like? What kinds of plants and animals did they see? Did they have fun or not?

### Materials Needed

[Teacher Slides](#)

[\(Optional\) Postcard Template](#)

Cardstock

Colored pencils

(optional) Books about arctic climate in case a group is interested  
*Antarctica, King of the Cold*  
& *How do we Study Cold*



# SESSION 4: How do people shelter in different parts of the world?

## Warm-up

Ask students if they remember where they traveled in the last activity. What was the climate like in their part of the world? How do homes have to be different in order to provide shelter in different climates? Do any students have experience living in a shelter that is different from the homes we live in here in the PNW? Ask students to connect to their experiences and to share any unique stories they may have.

## Main activity

Have students work in teams to watch a video about traditional housing from a certain part of the world. Students will work together to understand the home they selected and will create a poster highlighting how this home is an asset to people who live there. Here are some guiding questions that students can think about in groups after they watch the video:

- What materials is this house made of?
  - » How do people gather or make these materials?
- What kind of climate is this home created for?
- What kind of weather-hazards does this home shelter people from?

Ask students to draw a diagram showing the traditional or indigenous home in its climate. Students can draw on a large piece of paper, chart paper, on the computer, or whatever method best fits the resources available to you and aligns with students' preferred methods. [Here is a thinking template and checklist](#) that can help students think together and plan their mini-project.

## Wrap-up

Facilitate a gallery walk where students can spend a few minutes studying the posters made by other teams. Encourage students to think about the following things about each home:

What materials is this home made of?

What climate does it help shelter people from?

Why do the materials it is made of help protect people from the weather in that climate?

Thank students for their hard work and for helping each other gain a better understanding of how people build housing around the world!

### Materials Needed

[Teacher Slides](#)

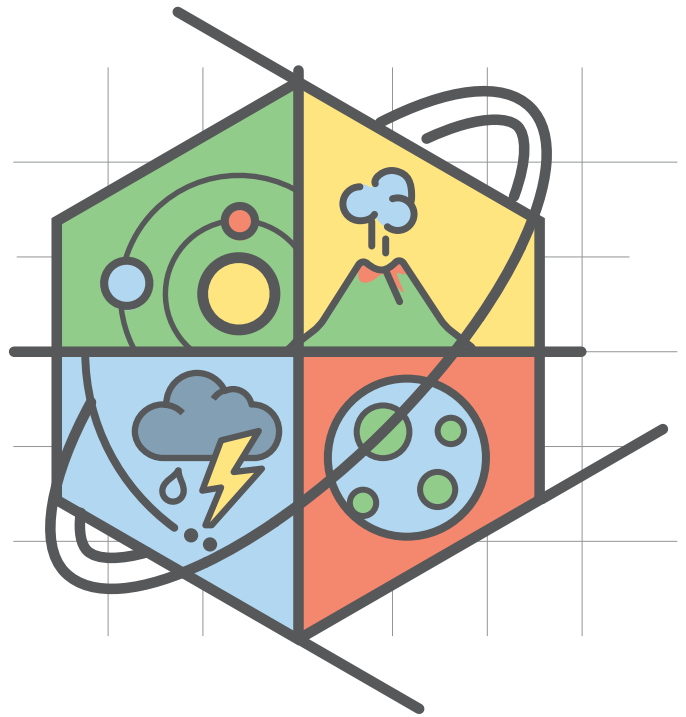
[Traditional Housing Research](#)

Chart paper or large paper  
(1 per team)

Colored pencils



# LESSON 4: Extreme Weather & Building Our Shelter



**STRATEGY: ELABORATE**

In this lesson, students will extend their understanding of how weather impacts people by studying different types of extreme weather. Students will work in expert groups to learn about one type of extreme weather. They will also brainstorm ways that people can shelter extreme weather. As a community, the class will build an understanding of different types of weather and how we shelter from it.



# SESSION 1:

## Extreme weather research

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### Warm-up

Share the driving question for the unit with students. Present students with the driving question: ***How can we create a prototype for a temporary home that can be used by people?*** Show students the introduction to Extreme Events video that is shared in the slideshow. The rest of the videos will be explored by teams as they specialize and better understand one type of extreme weather.

### Main activity

Have students work in teams to watch a specific video about an extreme weather event. Multiple teams can focus on the same weather event. Ask students to fill out the Extreme Weather Expert Report which will help them to summarize information and organize their ideas.

Students and teams can also read about all extreme weather events by studying the [“10 Freaky Forces of Nature”](#) info sheets.

Teams can use this [Extreme Weather Expert Groups sheet](#) to think about and explain what characterizes their type of extreme weather.

The first page of the template asks students to draw and explain what their extreme weather event looks, feels, and sounds like. Extreme weather can become ***natural hazards*** that threaten the survival of humans. A hazard is something that can cause harm. On the next page, teams are asked to brainstorm housing solutions to protect from this type of weather. Please have students’ traditional home posters accessible so they can draw on ideas from them. Out-of-the-box thinking is also encouraged.

### Wrap-up

Ask students to think about the different images they saw of structures that people have built to prevent erosion. Is there anything from the pictures that can be used to answer the driving question? Is there any evidence they saw? (ex. people use things like rocks and soil to build structures to help prevent erosion).

### Materials Needed

[Teacher slides](#)

[Extreme Weather Expert Groups sheet](#)

[“10 Freaky Forces of Nature”](#)

Chart paper or computers for teams to make slideshow



# SESSION 2:

## Extreme weather presentations

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### Warm-up

It will be important for teams to share their extreme weather event information and ideas with each other since they will be designing a house that can withstand this natural hazard. Have each team briefly present what their extreme weather was and what solutions they brainstormed.

### Main activity

Give teams time to create a poster or a google slide that shares what their natural hazard is, how it presents a risk to people, and how people can build a home that shelters them from this problem. Please use a presentation mode that is best based on your students' skills and resources available to you.

### Group presentations

If possible, allow each group to present their main points in a showcase or a gallery walk. Keep students' posters/slideshows available to use as resources for the final design thinking project, where students will design a prototype home to shelter people from extreme weather conditions.

### Materials Needed

[Teacher slides](#)

[Extreme Weather Expert  
Groups sheet](#)

Chart paper or computers  
for teams to make  
slideshow





# SESSION 1:

## Empathy

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### Warm-up

Present students with the driving question for the unit and ask them to think about the following question: How do homes help us? Ask them to talk with a partner and then ask student groups to share their ideas with the whole group.

### Main activity

Share the [Design Thinking Notebook](#) with students. This is the space where they will describe and refine their ideas as they engage in the Design Thinking Process. Ask students if they know what the word “empathy” means. What does it mean to “empathize” with someone? Allow students to share their ideas. Explain to students that empathy, or understanding the reality of another person’s experience, emotions, or problems, is very important as we think about designing a solution that will help people who don’t have a home or need temporary shelter.

Have students work in groups to start reflecting in their Design Thinking Notebooks.

### Wrap-up

Bring the group together and ask students to share their ideas. Why are homes important? Let students know that the next day, they will start planning the prototype home for a person in need.

### Materials Needed

[Teacher slides](#)

[Design Thinking Notebook](#)





# SESSION 2:

## Defining the problem & ideating

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### Warm-up

Ask students to think about the weather conditions that they are designing their shelter for. "As we've studied, weather and climate can be very different in different parts of the world. What type of weather and climate are you designing your house to withstand?"

### Main activity

Students can work in their teams to select some extreme weather events, to identify the characteristics of this type of weather, and to come up with some solutions to this problem. Students are defining their problem and beginning the process of ideation.

"With your team, decide which 2 types of extreme weather or weather-related hazard your shelter will protect people from. Select two from the list below."

- Extreme heat
- Thunderstorms
- Blizzards
- Hurricanes
- Tornadoes
- Hail
- Floods

### Wrap-up

Have student teams share the materials they plan on using so that you can be sure that you have time to gather extra resources you may need. Ask the teams to share what weather they selected.

### Materials Needed

[Teacher slides](#)

[Design Thinking Notebook](#)



# SESSION 3:

## Refining ideation

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### Warm-up

Ask teams to review the weather conditions and ideas they previously selected and brainstormed. Give students a few minutes to talk about these and review.

### Main activity

Ask students to work with their teams to combine their ideas into one prototype plan. Have them draw a diagram in their Design Thinking Journal and to pay attention to the constraints listed there. Constraints are the limitations of their design. We practice having constraints in the design thinking process because we often have constraints when we are designing solutions in real-life.

Ask students keep these Constraints (limitations) in mind:

- Must be no bigger than 6 inches by 6 inches
- Must stand on its own without your support.
- Must be secured to the cardboard piece you are given.
- Must have a way for people to get in and out.

### Materials Needed

[Teacher slides](#)

[Design Thinking Notebook](#)



# SESSIONS 4-5:

## Prototype (BUILDING SESSIONS)

### Main activity

Give students a few sessions to build their physical prototypes. Remind students about their constraints and criteria. The criteria of the prototype is for it to withstand the weather conditions that the team selected. Below are some ideas on how to test students' prototypes for various weather conditions. If you or your students have better ideas about testing, please use them!

EXTREME HEAT	Blow dryer on high & hot setting for 60 seconds.
THUNDERSTORMS	Blow dryer on high (cool) with watering can pouring.
BLIZZARD	Blow dryer on high (cool) with watering can pouring
HURRICANE	Blow dryer on high (warm) with watering can pouring
TORNADO	Two blow dryers blowing at house (one cool setting and one hot setting) from opposite directions
HAIL	½ cup of small objects (like beans or lentils) being poured on house.
FLOODS	House placed in bin and water poured into bin to fill to a level of 1 inch (or 2 cm)

### Materials Needed

[Teacher slides](#)

[Design Thinking Notebook](#)

Glue (not provided in kit)

1 Cardboard piece (8" x 8") OR tin pan for each team

Construction paper

Straws

Craft sticks

Cloth pieces

Clay

Tape

Plastic wrap

Wax paper

String

Foil

Cups

Push pins



# SESSION 6:

## Testing (OPTIONAL)

### Main activity

For this session, work with each team individually to help them test their prototype. You can create a testing station where students' prototypes can be tested. We have suggested some ideas for replicating weather conditions, but they will have their limitations and the process can be messy. Please expand and adapt as you find necessary. If time and resources are limited, you can skip this process.

Invite each team to bring their prototype to the testing station and to identify the two tests that they will conduct to see if their prototype holds up against several weather conditions. Remind students that this is an internal test that their team will use to reflect about their design. This is not a competition.

After each test, allow teams to have a little time to assess damage. After both tests are performed, ask the team to take some time filling out the reflection pieces in their Design Thinking Journal.

### Materials Needed

[Teacher slides](#)

[Design Thinking Notebook](#)

1 basin (to hold water while testing for flood resistance)

Watering can or pitcher (testing for precipitation resistance)

Beans (or lentil, rice, etc.) to simulate hail

Filter cups (with holes) to simulate floodwaters

Testing materials (these are not provided in the kit due to limited space)

2 blow dryers (with warm and cool settings) or a fan



# FINALE! Students share their designs with their community

*This is a culminating session where you can invite guests to celebrate students' hard work by providing a place where they can share their design solutions. Invite parents, administrators, other teachers, or other classes for a design solution showcase. Students can also showcase for a neighboring class if a larger event is not plausible. Display students' weather and climate research posted so the community can see what students were learning throughout the unit.*

## Warm-up

Start the session by showing the audience the problem that students were trying to solve. Slides from Session 1 can be used to present the problem that students were solving. Share the driving question with the audience.

## Main activity

Organize a gallery walk style layout where student teams are able to converse with guests about their projects and how they engaged in the design thinking process. Make sure students had ample time to practice talking about their prototype houses and how they designed them.

## Wrap-up

Thank guests for attending and commend students for their excellent work!

### Materials Needed

Teams' prototypes

Completed Design Thinking Notebooks

[Slides from Session 1](#)

Other posters and work that students have completed throughout the unit



# How This STEM Storyline Supports Next Generation Science Standards

Performance Expectation	Connections to Classroom Activity, <i>Students:</i>
<p>3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.</p> <p>3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.</p> <p>3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard</p>	<ul style="list-style-type: none"> <li>Collect and graph weather data that represents weather conditions over the span of several days.</li> <li>Study climates in different parts of the world and share this information with their classmates.</li> <li>Study how different traditional and indigenous houses shelter people from weather-related hazards.</li> <li>Design their own prototype shelter that protects people from natural hazards.</li> </ul>
<b>SCIENCE &amp; ENGINEERING PRACTICES</b>	
<p>Asking questions and defining problems</p> <p>Developing and using models</p> <p>Analyzing and interpreting data</p> <p>Constructing explanations and designing solutions</p> <p>Obtaining, evaluating, and communicating information</p>	<ul style="list-style-type: none"> <li>Ask questions about how they can create a shelter to protect from natural hazards. They explore the ideas of weather and climate and define the different weather-related problems caused by various extreme weather events</li> <li>Create prototype models that represent a design solution to shelter people from a weather-related hazard.</li> <li>Collect and analyze weather data to show how weather patterns are changing over a span of time.</li> <li>Students explain how homes, including traditional and indigenous housing, protects people from environmental hazards. Students design a temporary shelter for people to protect from natural hazards.</li> <li>Research, summarize, evaluate, and communicate information about weather, climate, and design solutions throughout the unit.</li> </ul>
<b>DISCIPLINARY CORE IDEAS</b>	
<p>ESS2.D: Weather and Climate</p> <p>ESS3.B: Natural Hazards</p>	<ul style="list-style-type: none"> <li>Record patterns of weather and make predictions about weather.</li> <li>Learn about climate and how it is defined by typical weather conditions in an area.</li> <li>Study climates from around the world and the characteristics that make them different.</li> <li>Learn about many natural hazards and how people around the world have built housing to reduce the impacts of natural hazards.</li> </ul>
<b>CROSCUTTING CONCEPTS</b>	
<p>Patterns</p> <p>Cause and Effect</p>	<ul style="list-style-type: none"> <li>Study the predictable pattern of weather in an area and how this determines the climate of a region.</li> <li>Study how extreme weather events can become natural hazards that risk peoples' safety.</li> <li>Design solutions that can protect people from natural hazards.</li> </ul>

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required. <https://www.nextgenscience.org>

