



Junior *FIRST*LEGO® League

Weather is measured in short lengths of time (hours and days), but climate is the average weather and its variability over many years in one place. We can look out our window and see how weather changes every day or we can watch a weather forecast to decide what to wear tomorrow. We need data that has been tracked over decades to understand how the climate may be changing.

Climate tracking is important to communities around the world because the information is used to plan, predict, and make decisions on activities like planting crops or hunting and fishing. People also use data to anticipate the impacts of climate on the economy, food and water availability, flooding, tourism, disease control, and many environmental issues.

Why is climate important to us? By gaining a greater understanding of the Earth's complex climate systems, we will be able to work together now and in the future to develop the innovative solutions that will benefit us all and continue to improve the world in which we live.

We want you to learn about how scientists study climate and tell us how you might study it! Your final products will include a MODEL and a POSTER.

THE STEPS

1 - **Research climate and find out what the word means.**

Compare climate and weather-- what are the differences? Choose a community (your own or another one) and learn more about the climate of that area. Can you predict what next winter will be like based on earlier winters? Can you make a guess about how well crops will grow next summer? You might want to look at an almanac at your local public library to do this.

2 - **Learn about how scientists study climate.**

Look at the tools and equipment used in tracking climate. Are there particular tools used for your area?

Scientists use huge drills to extract ice cores from large ice sheets and glaciers in Polar Regions to study how the environment has changed. At lower latitude sites, they might drill small cores from tree trunks to see how much a tree grew each year of its life. Simpler devices such as rain gauges can be used to measure rainfall and that data can be saved on a computer and tracked for years and years.

Consider taking a field trip to help you learn more about climate. You might visit the meteorologist at your local television station to find out how they track climate. Consider talking with a farmer about how they know when to plant certain crops. Wildlife experts might be able to tell you how they watch the movement of animals

to see the effects of climate and fishermen might be able to tell you when they expect to catch the most fish.

Presenting your work:

THE MODEL

Build your own tool to study climate. The tool you build should include a simple machine. You may invent your own tool or improve a tool that scientists already use. You may create it to scale or size it down.

The model:

- Must fit onto a 15" X 15" base plate or in a 15"x15" footprint
- Should be constructed from only LEGO elements. You can use any LEGO elements you like except for DUPLO bricks and the NXT brick.
- Must include a piece that can move. This can be moved by hand or you can use the motor included in the Jr.FLL base kit.
- Should include one simple machine. Simple machines include: inclined planes, levers, pulleys, gears, wheels and axles, screws, and wedges.

Modifying bricks (i.e., painting, decorating, attaching anything, etc.) is not allowed. Your Jr.FLL kit has all of the parts needed to build simple machines! To learn more about simple machines, visit the websites provided or research at the library.

This model may be of one instrument or of a collection of instruments and may be used anywhere in the world. Perhaps you would like to build a research station in the Arctic, the tropics, the desert, or a station for your own backyard. The choice is yours, but make sure it makes sense for the place you propose using it!

THE POSTER

Create a Show Me Poster depicting your research journey.

This poster should include:

- Your team info including team name. Some teams have included information about and/or photos of every team member. The reviewers love this!
- pictures of what you studied
- examples of the climate for the area you studied
- an illustration of the machine you built that demonstrates how it works

Your Show Me Poster can be created on any poster material such as a standard flat poster board (22" x 28") or on tri-fold presentation board (36"x48"). If you attend a Jr.FLL event, you will be sharing your Show Me Poster and model with reviewers and talking to them about what you learned. Each team will be given a limited amount of space to showcase its work, so be careful to use the size guidelines provided.

5 – Share the things you've learned with others.

You might want to share your poster and your invention with your parents, with your class, with friends, or with someone who helped you this season.

Resources & Extended Learning:

Climate Classroom

<http://www.climateclassroom.org/>

Woods Hole Oceanographic Institute's page on climate and oceans

<http://www.whoi.edu/page.do?pid=11939>

Project BudBurst

http://www.windows.ucar.edu/citizen_science/budburst/

University Corporation for Atmospheric Research (UCAR)

<http://www.windows.ucar.edu/tour/link=/earth/climate/climate.html>

NCAR: Weather and climate basics: <http://www.eo.ucar.edu/basics/index.html>

Simple machines explained by the Franklin Institute in Philadelphia, PA

<http://sln.fi.edu/qa97/spotlight3/spotlight3.html/>

A game that helps kids identify simple machines found in a garage

<http://www.edheads.org/activities/simple%2Dmachines/>

Great, everyday examples of simple machines

<http://www.mikids.com/Smachines.htm>

Photos of simple machines in action from the Museum of Science in Boston, MA

<http://www.mos.org/sln/Leonardo/InventorsToolbox.html>

Some children, especially younger ones, may find it challenging to think about time in terms of decades and hundreds of years. This is a great opportunity for a math activity introducing the concept of long periods of time. To help your team begin to understand long periods of time, you could have them keep a daily diary of the weather over the course of the Jr. FLL season.

This is also a terrific opportunity to explain simple machines (inclined planes, wedges, screws, wheels, levers, and pulleys) to your team. Before they build the model, they may want to explore simple machines through books, websites, and experimenting with LEGO pieces.

Send feedback on these resources to jflsupport@usfirst.org and let us know how they helped you!