**GYSTC Fourth Grade STEM Activity**

Unit: Weather

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| **Title:** Weather Instruments**Estimated Time:** 5 days |
| **Standards:** **S4E4. Obtain, evaluate, and communicate information using weather charts/maps and collect weather data to predict weather events and infer weather patterns.**1. Ask questions to explain how weather instruments (thermometer, rain gauge, barometer, wind vane, and anemometer) are used in gathering weather data and making forecasts.
2. Interpret data from weather maps to identify fronts (warm, cold, and stationary), temperature, and precipitation to make an informed prediction about tomorrow’s weather.
3. Ask questions and use observations of cloud types (cirrus, stratus, and cumulus) and data of weather conditions to predict weather events and patterns throughout the year.
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| **Crosscutting Concepts & Science and Engineering Practices:** |
| **Big Ideas/Enduring Understandings:*** Some events in nature have a repeating pattern.
* The weather changes some from day to day, but things such as temperature and rain (or snow) tend to be high, low, or medium in the same months every year.
* Weather is a daily occurrence, climate occurs over an extended period of time.
* The types of clouds indicate the weather conditions and can be used to predict the weather.

**Essential Questions:**What are forms of precipitation?How do meteorologists use the following weather instruments rain gauge, thermometer, anemometer, barometer, and wind vane?How do you distinguish between weather and climate?Why are weather symbols important on a weather map?How do we know if a weather forecast is accurate?What do the clouds tell about the weather? | **Vocabulary:**ThermometerRain gaugeBarometerWind vaneAnemometerWarm frontCold frontStationary frontTemperaturePrecipitationCirrusStratusCumulus |
| **Materials:**boxesplastic drink bottlesrubber bandscraft stickstapepaper clipspaper platesstraight pins/push pinspaper towel/tissue paper rollsrulerbrads yard or meter stickpaper cupsballoonsstrawsdowel sticks/skewersscissorsconstruction paperSharpie markersiPads or video cameras  | **Safety Considerations:**Monitor students closely as they use the scissors to cut with and when handling glass. Monitor students when accessing the internet. |
| **Project Overview:**Students will create a weather box showing three weather instruments and create a digital users guide by videotaping how to use it.  |
| **Instruction:****Teacher Background:** In our science unit on weather, we have been learning about different types of precipitation as well as the instruments that are used to collect data to forecast the weather. We’re going to put our knowledge to use by creating a weather station outside our school. **Technology sites:**Weather Wiz Kids- <http://www.weatherwizkids.com/weather-instruments.htm> (student friendly, has lots of information)Simple Weather Instruments- <http://www.rmets.org/sites/default/files/pdf/simweameasurements.pdf> (teacher resource)**Day 1: Ask Engage**Show a video clip of the Weather Channel and have the students listen carefully to see if they hear any of the names of the weather instruments. Ask the students how the weather reporters get their facts and information. Show pictures of weather stations and see if the students can name the instruments and their uses: <https://www.google.com/search?q=pictures+of+weather+stations&es_sm=122&tbm=isch&tbo=u&source=univ&sa=X&ved=0CB4QsARqFQoTCJCKgeOq-sYCFYYWPgodGyQArw&biw=1600&bih=799>Show the weather instrument flashcards and see if students can guess the instrument and its use: <https://quizlet.com/18547080/4th-grade-weather-instrument-vocabulary-flash-cards/> . Introduce the challenge to the class and have students complete the ask/engage part of their student journal.**Challenge:** Weather boxes are among one the new “must have” items at local elementary schools. These boxes contain the instruments needed to collect data in a weather-protective structure. It will be your responsibility as a structural engineer and weather expert to help the school create the most attractive, useful, and accurate weather box possible. To help the school learn how to use it, you will need to create a digital step-by-step user’s guide.**Day 2: Imagine/Brainstorm****Criteria:** Your weather box must:* Contain 3 different weather instruments (thermometer, rain gauge, barometer, wind vane, or anemometer)
* Fit in a space no larger than 12 X 12 X 18
* Sit off the ground
* Protect the instruments from the elements
* Be attractive and neatly made
* Use only the materials provided by the teacher
* Create a digital user’s guide for operation

**Constraints:*** Use the materials provided
* Complete the challenge in the time allotted

Have students individually think of a solution to the problem and draw and label their design.**Day 3: Plan/Design**Each student will present their ideas to their team. Teams will collaborate and decide on a final design plan. Students draw and label their final design plan and make a list of needed supplies. Build their design according to their plan.**Day 4: Create/Test**Student teams build their design according to their design plan. Students will need to record their digital user guides during this time. It may be helpful to set up a “quiet zone” in the hallway or a neighboring space for recording purposes. **Day 5: Evaluate/Improve**Students evaluate their design for success. Did it meet the established criteria? Did their final design match their planned design? How would students improve their design? |
| **Closing/Culminating Activity:** Students will share how their weather instrument models and the user guides they created. An idea for extension would be to have groups trade instruments and use them for one week, offering feedback to the creators and suggestions for improvement. Students could also compare the data collected with each set of weather instruments in order to discuss accuracy and discrepancies between weather instruments.  |