



# Pinecone Hygrometer

No need to check the morning news for the weather, use a pinecone as a hygrometer to measure the amount of humidity in the air! Explore how pinecones can sense levels of water moisture and use it to their adaptive advantage.

## TEKS:

SCI 3.8A: The student is expected to observe, measure, record, and compare day-to-day weather changes in different locations at the same time that include air temperature, wind direction, and precipitation.

SCI 4.8A: The student is expected to measure and record changes in weather and make predictions using weather maps, weather symbols, and a map key.

SCI 8.10B: The student is expected to identify how global patterns of atmospheric movement influence local weather using weather maps that show high and low pressures and fronts.

## Materials:

- 2L bottle
- Glue
- Graph paper
- Pen
- Pinecone
- Straight pin
- Tape

## How To:

1. Make observations about the pinecone. Explore the pinecone's scales and make predictions about how you think they will move in different levels of humidity.
2. Cut the curved top portion of a 2L bottle to remove the lid just below the rim where the bottle becomes straight.
3. Cut an opening into the side of the bottle that is about 5 inches wide and 6 inches tall. You want to start the opening at the top of the bottle and work your way down to keep the bottom of the bottle intact.
4. Place a piece of paper along the remaining inner walls of the bottle and tape it in place.

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5. Carefully push a straight pin into the tip of one of the pinecone's scales. Choose a scale near the upper center of the pinecone.  
**(Warning: Use parental supervision during this step as straight pins are sharp!)**
6. Place the pinecone into the bottle with the pin aimed towards the paper. Glue the bottom of the pinecone to the bottle to keep it in place.
7. Use a pen to place a line on the paper aligned with the head of the straight pin. Mark this line with a "\*", as it serves as your reference point for other measurements.
8. Bring your hygrometer outside and secure it in a shady spot to remain overnight. Place it somewhere it won't tip over or get destroyed by possible weather conditions.
9. Over the next few days, check on the hygrometer and place new marks on the paper aligned with the pin. Each time you make a mark, check the weather to see what the humidity reading is and make a note of it next to the new marks.
10. Continue this process until you have made a scale with enough points that you can use the pinecone hygrometer to estimate the humidity without checking the local weather.



<https://thehappyscientist.com/content/pine-cone-weather>

### STEM Explanation:

A hygrometer is a device that measures the amount of humidity in the air. Pinecones have adaptations in their scales to protect their seeds. When the scales are closed, the seeds are trapped inside. Pinecone trees are very selective as to when they release their seeds. Pinecone seeds have wing-like structures that help the seeds travel to new locations in the wind. Seeds have a goal to go far away from their parent tree for the best chance of growing. The seed can travel best when the air is warm and dry. Moisture or rain can prevent seeds from traveling as far as they could in dry weather because the water adds weight to the seeds. When there is a lot of moisture in the air, cells on the surface of the pinecone scales can sense and absorb the water in the air. This causes the cells to expand. The pinecone scales bend towards the core and close to prevent the release of seeds. When the air is dry, the cells on the surface will shrink, causing the pinecone to open and release its seeds. The pinecone only releases seeds a few times, but the scales continue to move even when the seeds are all gone. Thanks to the pinecone's cells responding to water in the air, it can be used as a hygrometer!

### Career Connection:

*Meteorologists* are scientists who study the Earth's atmosphere by observing temperature, air pressure, water vapor, and their interactions and changes over time. They use a variety of precise instruments and simulations to predict the weather and understand weather patterns.

### Resource:

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