

5th Grade Weather Lesson - Remote

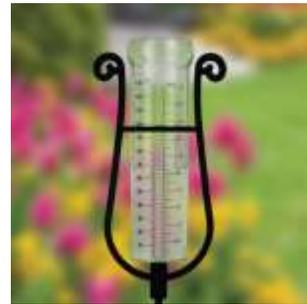
Weather – NC Science Standards 5.E.1.1, 5.E.1.2

How to measure and predict weather:

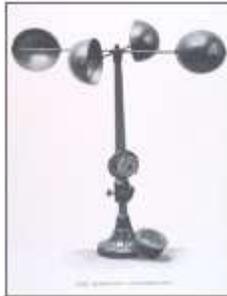
- What can we measure to help us predict weather?
 - Take a moment to think of as many things we could measure as possible (if we had the instruments) that would help us predict the weather.
 - Scientists measure:
 - Temperature with a thermometer



- Precipitation (like rainfall) with a rain gauge



- Wind speed with an anemometer



(a)



(b)



- Wind direction with a wind vane



- Air pressure with a barometer



- Let's see how we can take some measurements even if we don't have all of those instruments.
 - You can follow these directions to make a home-made thermometer: <https://www.wikihow.com/Make-a-Thermometer> (written directions with video clips) or <https://www.youtube.com/watch?v=EbrVwQpgEmc> (video)
 - You can follow these directions to make a home-made rain-gauge: <https://www.education.com/science-fair/article/DIY-rain-gauge/> (written directions) or <https://www.youtube.com/watch?v=vkgvT8HrINg> (video)
 - You can follow these directions to make a home-made cup anemometer: https://sercc.com/education_files/anemometer.pdf (written directions with precise steps and info on how to use anemometer to determine wind speed) or <https://www.youtube.com/watch?v=Af0LB3abBsk> (video)
 - You can follow these directions to make a home-made wind vane: <https://www.clearwaycommunitysolar.com/blog/science-center-home-experiments-for-kids/measuring-the-direction-of-wind-with-a-homemade-wind-vane/> (written directions) or <https://www.youtube.com/watch?v=cnZ5LYI19Vo> (video)
 - You can follow these directions to make a home-made barometer: http://www.stormthecastle.com/science_projects/how_to_make_a_barometer.htm (written directions) or https://www.youtube.com/watch?v=m_VFxqM41EM (video)
- Now it's time to take the measurements.
 - Measure the air temperature with a thermometer and write the number of degrees on your "Weather Worksheet". [If you don't have a thermometer or supplies to make one, describe how hot or cold it feels. Perhaps you could compare the temperature today to some other day or time of year, like "cooler than any day last week" or "as warm as on Memorial Day".]
 - Fun Fact: Did you know male crickets chirp faster when the temperature is rising? You can find the temperature by counting the number of chirps in 15 seconds and adding 37.
 - Check the rain gauge and write the amount in inches or centimeters on your "Weather Worksheet". [If you don't have a rain gauge or supplies to make one, describe how much it rained recently (a lot, a little, etc.) and include some observations like whether the water level is higher or lower than usual in gutters, ponds, ditches, streams, rivers, etc.]



- Measure the wind speed with the cup anemometer and record the miles per hour or kilometers per hour on your “Weather Worksheet”. [If you don’t have an anemometer or supplies to make one, estimate the wind speed using the chart below.]

0 mph	Smoke rises
1-3 mph	Smoke drifts
4-7 mph	Flags stir
8-12 mph	Leaves move
13-18 mph	Tree branches move
18-24 mph	Trees sway
25-31 mph	Flags beat
32-38 mph	Flags extend

From NeoSci “Exploring the Weather”



- Determine the direction the wind is blowing from with a wind vane and record the direction on your “Weather Worksheet”. [If you don’t have a wind vane or supplies to make one, use a piece of cloth, a scarf, or a tissue. Hold it up and see which way the wind blows it. The wind is blowing from the opposite direction, and that is the direction you’ll want to record.]

- You can use a compass to determine the direction. [If you don’t have a compass, you can use your body as one. Stand with your arms straight out with your right hand pointing to where the sun rises and your left hand



pointing to where the sun sets. Your face will be pointing toward the north. The back of your head will be facing south. Your right hand will be pointing east, and your left hand will be pointing west.]

- Use the following abbreviations for the direction from which the wind is blowing:

N = North
 NE = Northeast
 E = East
 SE = Southeast
 S = South
 SW = Southwest
 W = West
 NW = Northwest

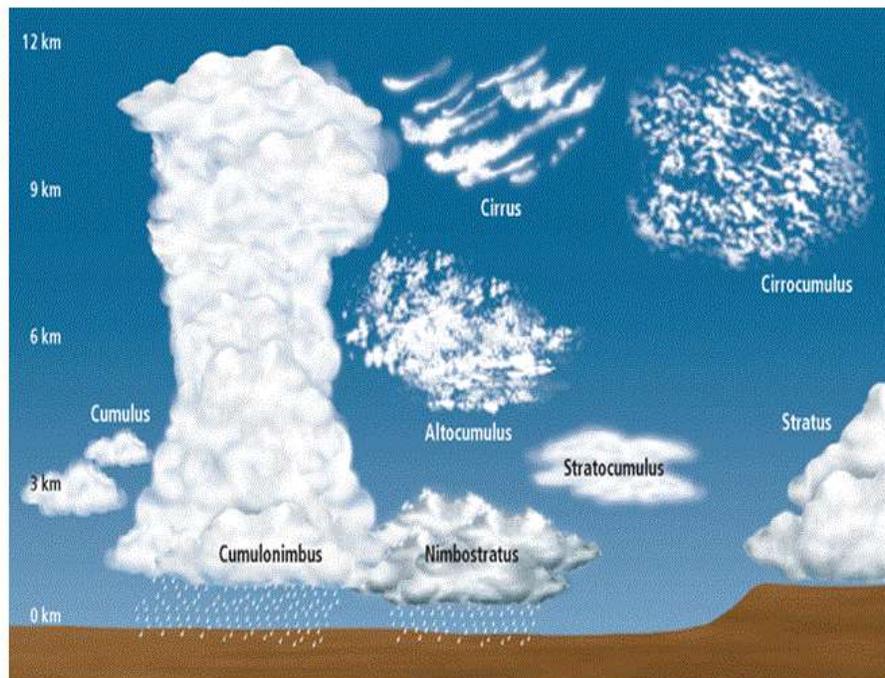


- Measure the air pressure with the barometer and record your measurement on your “Weather Worksheet”, Air pressure is usually measured in inches of mercury (in. Hg) or pounds per square inch (p.s.i.), but if you are using a barometer you made, you can simply tell whether the air pressure is higher or lower than another recent measurement you made. [If you don’t have a barometer or supplies to make one, use plants to help you predict whether the air pressure is dropping and stormy weather is likely to occur. If grass has dew on it in the morning, rain is less likely. If grass is dry at sunrise, then clouds,

strong breezes, and rain are more likely. Winds bringing stormy weather often toss leaves on trees about, so the leaves show their lighter-colored undersides. In low pressure conditions before it rains, plants often release waste gases that smell like compost, swamps release more methane, and flowers release stronger fragrances.]



- Next, let's get ready to identify clouds.
 - Here is a chart that shows different types of clouds.



- Clouds with “nimbus” in the name (cumulonimbus, nimbostratus) bring rain. Cumulus clouds are known as fair weather clouds. To find out what type of weather is associated with each type of cloud, click on this link: <https://www.sciencelearn.org.nz/resources/628-observing-clouds-and-weather>
- “Cumulus” means pile or heap. “Stratus” means layered or spread out. “Cirrus” means curl and refers to curved, wispy clouds. “Nimbus” means rain-bearing.
- Watch the 7-minute video “Cool Clouds” by NASA to learn more about clouds and see a scientist make a cloud and some fog in the laboratory. Click on this link: <https://www.youtube.com/embed/7MnxnOHCCic>

Make your own CloudSpotter Wheel by clicking on the link below from the National Weather Service, printing the pages, cutting along the lines, and fastening the two circles together with a brass fastener.



<https://www.weather.gov/media/jetstream/clouds/cloudwheel.pdf>

- Now let's predict the weather.
 - Click on the attachment for the Weather Predictor and Cloud Observation Log.
 - Print out the 2 pages. Take the Weather Predictor, Cloud Observation Log, your CloudSpotter, a pencil, and your weather instruments outside. Make your observations and record your data on the Cloud Observation Log. Use the Weather Predictor to help you forecast what the weather will be like over the next 12 hours.
 - Check your prediction for accuracy later on. Continue making observations and predictions for the next few days.

IMAGE SOURCES

Thermometer - <https://www.zoro.com/zoro-select-analog-thermometer-40-to-120-degree-f-3lpe2/i/G4157684/>

Rain gauge - <https://www.gertens.com/rain-gauge-in-decorative-holder.html>

Cup Anemometers - <https://www.mdpi.com/1996-1073/10/11/1860/htm>

Digital Anemometer - <https://www.rmusc.com/products/handheld-anemometer>

Wind vane - <https://www.indiamart.com/proddetail/wind-vane-wind-direction-13641122788.html>

Aneroid barometer - <https://www.fishersci.com/shop/products/oakton-aneroid-barometer/13300176>

Cricket – <https://www.premiumtpc.com/cricket-control>

Smoke rising from fire – <https://ecology.wa.gov/Air-Climate/Air-quality/Smoke-fire/Outdoor-residential-burning>

Flag beating in the wind – <https://abcnews4.com/news/local/south-carolina-town-honors-black-wii-vet-7-decades-after-brutal-beating>

Compass – <http://www.nglish.com/spanish/en/compass>

Person with outstretched arms – <https://www.pxfuel.com/en/free-photo-qwmvk>

Compass directions - <https://www.pinterest.com/pin/561190803561428446/>

Dew on grass – <https://www.goodfon.com/download/trava-zelen-makro-rosa-na-trave-avtorskoe-foto-elena-anikina/1920x1080/>

Cloud chart -

<http://www.loving2learn.com/SuperSubjects/SuperScience/LifeScience/Weather/CloudChart.aspx>

CloudSpotter - https://www.weather.gov/jetstream/ll_headclouds

Weather Worksheet

1. Measure the air temperature with a thermometer and write the number of degrees Celsius (°C) or Fahrenheit (°F). [If you don't have a thermometer or supplies to make one, describe how hot or cold it feels. Perhaps you could compare the temperature today to some other day or time of year, like "cooler than any day last week" or "as warm as on Memorial Day".]

2. Check the rain gauge and write the amount in inches or centimeters. [If you don't have a rain gauge or supplies to make one, describe how much it rained recently (a lot, a little, etc.) and include some observations like whether the water level is higher or lower than usual in gutters, ponds, ditches, streams, rivers, etc.]

3. Measure the wind speed with the cup anemometer and record the miles per hour or kilometers per hour on your "Weather Worksheet". [If you don't have an anemometer or supplies to make one, estimate the wind speed using the chart below.]

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4. Determine the direction the wind is blowing from with a wind vane and record the direction. [If you don't have a wind vane or supplies to make one, use a piece of cloth, a scarf, or a tissue. Hold it up and see which way the wind blows it. The wind is blowing from the opposite direction, and that is the direction you'll want to record.]
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 - Use the following abbreviations for the direction from which the wind is blowing: N = North, NE = Northeast, E = East, SE = Southeast, S = South, SW = Southwest, W = West, NW = Northwest

5. Measure the air pressure with the barometer and record your measurement. Air pressure is usually measured in inches of mercury (in. Hg) or pounds per square inch (p.s.i.), but if you are using a barometer you made, you can simply tell whether the air pressure is higher or lower than another recent measurement you made.

[If you don't have a barometer or supplies to make one, use plants to help you predict whether the air pressure is dropping, and stormy weather is likely to occur. If grass has dew on it in the morning, rain is less likely. If grass is dry at sunrise, then clouds, strong breezes, and rain are more likely. Winds bringing stormy weather often toss leaves on trees about, so the leaves show their lighter-colored undersides. In low pressure conditions before it rains, plants often release waste gases that smell like compost, swamps release more methane, and flowers release stronger fragrances.]



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Calculations...

- The Chirping Thermometer

Male crickets chirp faster when the temperature is increasing. To find the temperature, count the number of chirps in 15 seconds and add 37.

- Calculating the Miserability Index

Add the temperature to the relative humidity. If the sum is greater than 150 it will be a “sticky” day!

- Distance Between You and a –Thunderstorm

Count the seconds between you and the time between an observed flash of lightning or a clap of thunder. Every 5 seconds equals 1 mile.

Using Plants to Forecast Weather:

Test these plants signs:

- Impending thunderstorm - upturned leaves on silver maple trees. Dandelions fold inward.
- Rain - dry grass (no morning dew) in the morning.
- Nice day - dew on grass in the morning.

Estimating Wind Speed:

Use the following outside reference signs indicating wind speed:

- 0 mph Smoke rises
- 1-3 mph Smoke drifts
- 4-7 mph Flags stir
- 8-12 mph Leaves move
- 13-18 mph Tree branches move
- 18-24 mph Trees sway
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- 32-38 mph Flags extend

Try to predict a future weather condition over the next 12 to 24 hours based upon wind direction and cloud formation. Record this prediction in the “Cloud Observation Log.” How accurate are your predictions?

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Weather Predictor

Cloud Type	Prediction
CIRRUS	<p>Wind From:</p> <p>NORTH Fair Weather</p> <p>EAST Increasing cloudiness</p> <p>SOUTH Increasing cloudiness, showers</p> <p>WEST Fair weather</p> <p><i>*NOTE: Occurs only in fair weather</i></p>
ALTOCUMULUS	<p>Wind From:</p> <p>NORTH Little change</p> <p>EAST Cloudy, possible showers</p> <p>SOUTH Showers</p> <p>WEST Possible rain, clearing</p>
STRATOCUMULUS	<p>Wind From:</p> <p>NORTH Clearing, cool</p> <p>EAST Stormy</p> <p>SOUTH Showers</p> <p>WEST Clearing</p>
CUMULUS	<p>Wind From:</p> <p>NORTH Clearing, cool</p> <p>EAST Increasing cloudiness</p> <p>SOUTH Thunderstorms</p> <p>WEST Possible showers</p>



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Cloud Observation Log

		Cloud Type(s)	Prediction Weather Conditions over the next 12 hours
Date:			
Time:			
Wind Speed & Direction:			
Date:			
Time:			
Wind Speed & Direction:			
Date:			
Time:			
Wind Speed & Direction:			
Date:			
Time:			
Wind Speed & Direction:			
Date:			
Time:			
Wind Speed & Direction:			