



# Scout Day 2012 Workbook ANSWERS!



# OFFICE TOUR (station 1)

1. The National Weather Service issues what products to help save lives and protect property.

Watches

Warnings

Advisories

2. Which of the following tools do meteorologists use to monitor and predict the weather?

a. Numerical Weather Models

b. Airport Observations

c. Satellites

d. Lightning Detection Systems

e. Upper Air Soundings

f. Radar

g. Microwave Ovens

3. True or False (circle the correct answer)

T  F All weather forecasts are correct.

T  F Looking at the same data, all meteorologists will make the same forecast

4. Put an "X" next to the types of weather that could be dangerous, damaging, or deadly to your community.

Thunderstorms    Floods    Flash Floods    Heat    Cold

Hurricanes    Frost/freezes    Lightning    Fires    Hail

Winter storms    High Winds    Rip Currents    Droughts

5. Circle all the ways that severe weather and flood warnings can reach homes (inside) in your community.

a. NOAA Weather Radio

b. Cell Phones

c. Outdoor Tornado Sirens

d. Local TV and Radio Stations

e. Internet

(Outdoor tornado sirens are not designed to alert people inside a home, only people outdoors)

6. The scientific study of the atmosphere and of atmospheric conditions, especially as they relate to weather and weather forecasting is known as meteorology.

7. Weather is the state of the atmosphere at a given time and place, with respect to variables such as temperature, moisture, wind velocity, and barometric pressure.

8. Climate is the meteorological conditions, including temperature, precipitation, and wind that typically prevail in a particular region over a long period of time.

# **Panel Discussion (station 2)**

1. How does weather affects people in the following jobs; list one part of the forecast that is most important to them and why?

**Farmers**

**Rain – field conditions too wet or too dry to plant, need to water**

**Temperature – killing frosts and freezes, too hot for some crops**

**Sailors**

**Wind – control of sail boats**

**Waves – capsize boats**

**Thunderstorms/lightning – nowhere to take shelter**

**Pilots**

**Wind - landing and take off**

**Turbulence – comfort and safety of passengers**

**Thunderstorms – safely operate plane**

**Cloud height and visibility – landing and take off**

2. Weather Careers

a. What weather-related career interests you the most? \_\_\_\_\_

b. What education is needed for this career? \_\_\_\_\_

\_\_\_\_\_

c. Name 2 major responsibilities for this career.

1) \_\_\_\_\_

2) \_\_\_\_\_

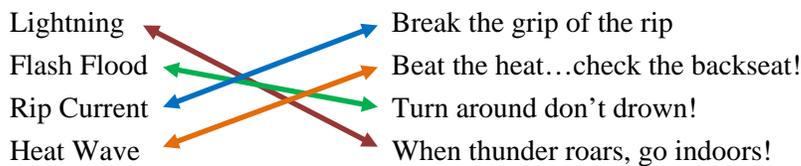
# **JEOPARDY (station 3)**

See *Thunderstorms, Tornadoes, Lightning* booklet for help answering the following

1. Match the five dangerous weather-related conditions with the safety rule for each when outdoors.  
(A safety rule can be used more than once)

Tornado	D
Lightning	A, B, D
Flash Flood	C
Hail	B, D
Wind	A, B, D

2. Match the NWS slogans to the dangerous weather threat:



3. A **watch** means severe weather is possible over the area for the next few hours. Be prepared!

A **warning** means severe weather is likely or already occurring, possibly life threatening.

4. True or False (circle the correct answer)

- T  F No location is safe from tornadoes, including cities, highway underpasses, lakes, rivers, campgrounds, and mountains.
- T  F If it is not raining, then there is no danger from lightning.
- T  F The rubber soles of shoes or rubber tires on a car will protect you from being struck by lightning.
- T  F People struck by lightning should not be touched because they carry an electrical charge.

5. Name three items that should be on your family safety plan:

See page 15 of the *Thunderstorms, Tornadoes, Lightning* brochure.

6. Name six items that should be in your emergency supply kit:

See pages 16-18 of the *Thunderstorms, Tornadoes, Lightning* brochure.

## Homework

Discuss the safety rules with your family, and then make your own safety plan for your family.

# MAKING AN ANEMOMETER

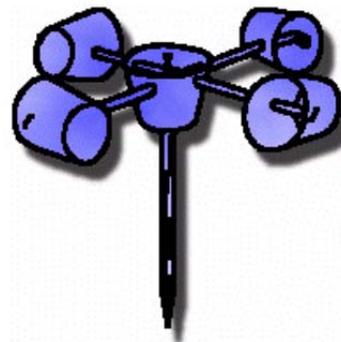
## (station 4)

- True or False:** Wind is caused from the sun heating parts of the earth like land and water differently.
- True or False:** The Wind blows from High pressure to Low pressure.

Revolutions in 10 seconds	Wind Speed (mph)
2-4	1
5-7	2
8-9	3
10-12	4
13-15	5
16-18	6
19-21	7
22-23	8
24-26	9
27-29	10
30-32	11
33-35	12
36-37	13
38-40	14
41-43	15
44-46	16
47-49	17
50-51	18
52-54	19
55-57	20

Use this table to estimate the wind speed using the anemometer you made!

Look at the **X** on the bottom of the cup as it spins around. Count the number of times it spins around (revolutions) in 10 seconds. Use the table below to estimate the wind speed.



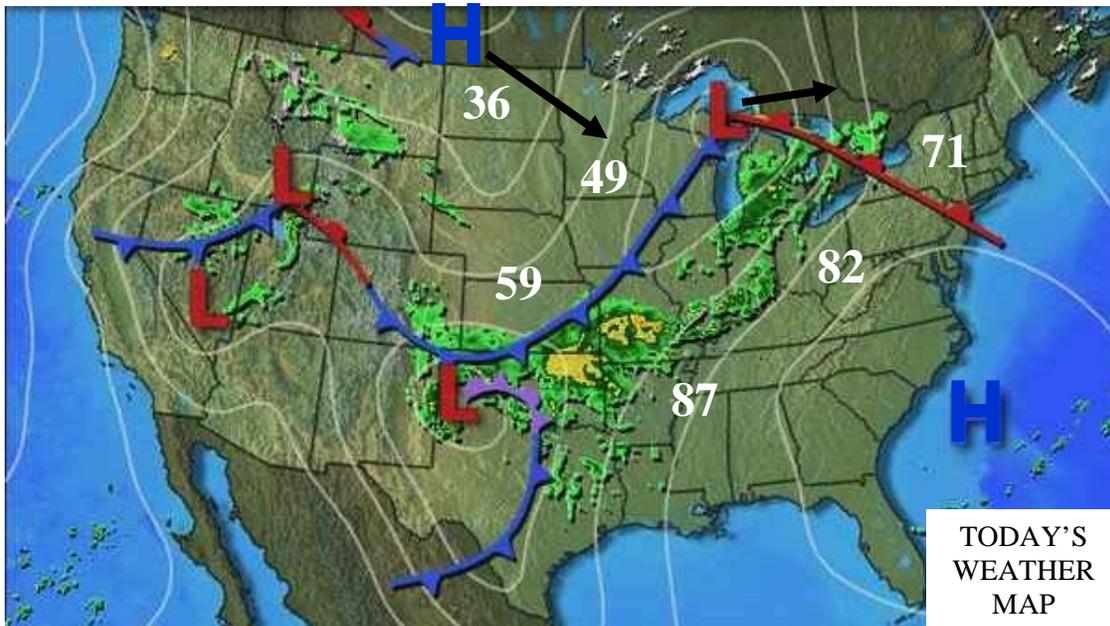
**Using the fans located at this station, document the wind speed using your anemometer.**

	FAN #1	FAN #2	CURRENT
Wind Speed (mph)			

# CLOUDS (station 5)

a. True or False (circle the correct answer)

- (T) F High pressure is often associated with good weather.
- (T) F Low pressure normally brings clouds, rain or snow, and stronger winds.

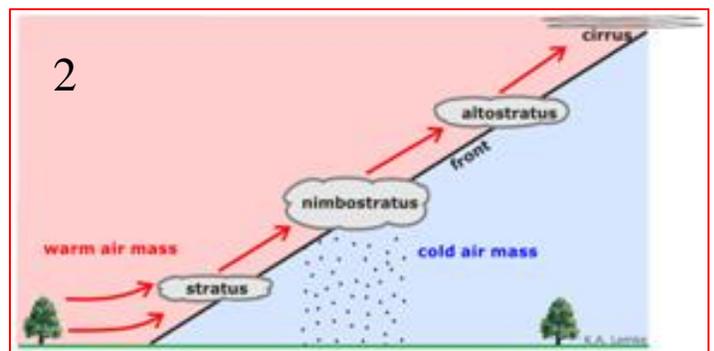
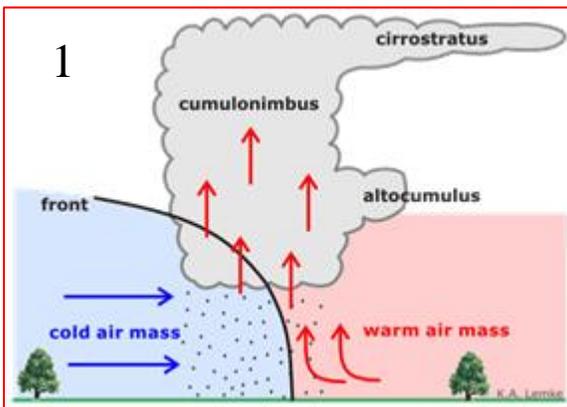


b. Pretend the weather map above is what is happening today. What kind of weather would you forecast for tomorrow for the Green Bay area?

As the cold front moves east of Green Bay, high pressure over southern Canada will move into the northern United States, bringing fair skies and cooler weather to the Green Bay area.

c. On the pictures below, draw arrows showing the direction of the movement of the:

1. Cold air and warm air with the cold front.
2. The warm air with the warm front.



# CLOUDS (station 5)

**Cirrus**



**Cirrostratus**



**Contrails**



**Altostratus**



**Altostratus**



**Altostratus Lenticular**



**Stratus**



**Nimbostratus**



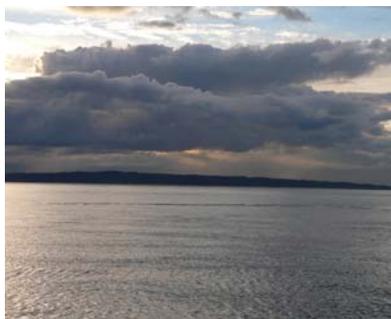
**Cumulus**



**Fog**



**Stratocumulus**



**Cumulonimbus**



# CLOUDS (station 5)

<p><b>HIGH</b> 20,000ft – 50,000ft</p>	<p><b>Cirrus</b></p> <p>Cirrus → Curl</p> <p>“Mares tails” Long wisps of cloud, thicker at one end than the other. Always associated with fair weather.</p>	<p><b>Cirrostratus</b></p> <p>A sheet of clouds. When thickening and increasingly covering the sky, it often means a change in weather, such as an approaching front.</p>	<p><b>Contrail</b></p> <p>Contrail → Condensation Trail Formed as water vapor in aircraft exhaust condenses and freezes forming cirrus clouds. Streaks may appear straight when wind shear is absent, or in a tangle if turbulence is present.</p>
<p><b>MIDDLE</b> 6,500ft – 20,000ft</p>	<p><b>Alto cumulus</b></p> <p>Alto → High (as in music second highest range)</p> <p>Alto cumulus Castellanus Looks like castle turrets. Presence may foretell thunderstorms later in the day.</p>	<p><b>Altostratus</b></p> <p>Very often covers the entire sky. Often forms from the lowering of Cirrostratus as a warm front approaches.</p>	<p><b>Alto cumulus</b> Alto cumulus Lenticular (Lens like shape)</p> <p>Seen as a stationary cloud. They often look like flying saucers. Formed as moist air is forced upward over mountain tops.</p>
<p><b>LOW</b> Up to 6,500ft</p>	<p><b>Stratus</b></p> <p>Stratus → spread out</p> <p>A diffuse, grayish cloud that covers much of the sky and often produces drizzle. Bases of cloud usually below 2,000 feet. Often seen in marine regions.</p>	<p><b>Nimbostratus</b></p> <p>Nimbus → Cloud producing rain</p> <p>Stratus cloud with continuously falling rain, snow, or sleet. No well defined base. Forms ahead of warm front as rain or snow begins to fall from altostratus.</p>	<p><b>Cumulus</b></p> <p>Cumulus → heap</p> <p>Fair weather cumulus, go away with sunset. Cloud types we like to watch to see different shapes.</p>
	<p><b>Fog</b></p> <p>A stratus cloud close to the ground or water is called fog.</p>	<p><b>Stratocumulus</b></p> <p>Looks like layers of cotton. Often forms from the rising of stratus. Prevalent cloud type in Great Lakes region due to the lakes.</p>	<p><b>Cumulonimbus</b></p> <p><b>Thunderstorm</b> Associated with these 5 hazards: Lightning, Hail, Strong Winds, Flooding from heavy rains, and tornadoes.</p>

# WEATHER BALLOON FACTS

- ❖ The radiosonde is a small, expendable instrument package that is suspended below a 2 meter (6 feet) wide balloon filled with hydrogen or helium.
- ❖ As the radiosonde is carried aloft, sensors on the radiosonde measure profiles of pressure, temperature, and relative humidity.
- ❖ By tracking the position of the radiosonde in flight, information on wind speed and direction aloft is also obtained.
- ❖ The radiosonde flight can last in excess of two hours, and during this time the radiosonde can ascend to over 35 km (about 115,000 feet) and drift more than 200 km (about 125 miles) from the release point.
- ❖ During the flight, the radiosonde is exposed to temperatures as cold as  $-90^{\circ}\text{C}$  ( $-130^{\circ}\text{F}$ ) and an air pressure only few thousandths of what is found on the Earth's surface.
- ❖ When the balloon has expanded to about 6 meters or 20 feet in diameter it bursts, then a small parachute slows the descent of the radiosonde, minimizing the danger to lives and property.
- ❖ Only about 20 percent of the approximately 75,000 radiosondes released by the NWS each year are found and returned to the NWS for reconditioning. These rebuilt radiosondes are used again, saving the NWS the cost of a new instrument. If you find a radiosonde, follow the mailing instructions printed on the side of the instrument.
- ❖ Worldwide, there are nearly 900 upper-air observation stations. Most are located in the Northern Hemisphere and all observations are usually taken at the same time each day (00:00 and/or 12:00 UTC), 365 days a year.
- ❖ Observations are made by the NWS at 92 stations - 69 in the conterminous United States, 13 in Alaska, 9 in the Pacific, and 1 in Puerto Rico. NWS supports the operation of 10 other stations in the Caribbean. Through international agreements data are exchanged between countries.

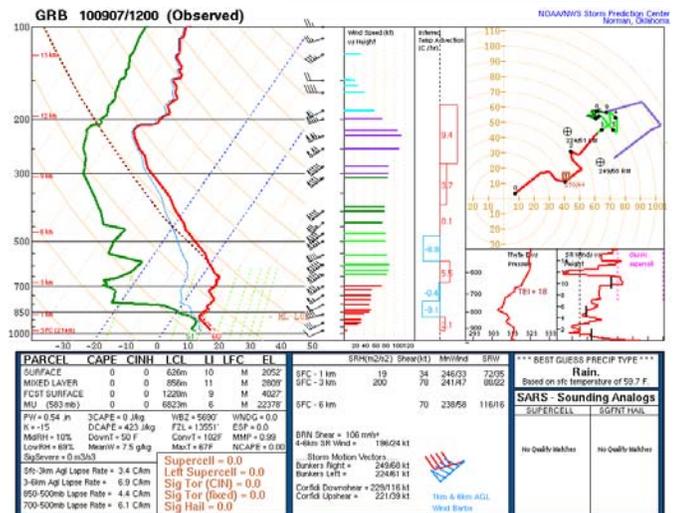
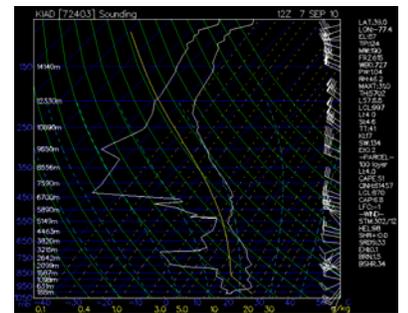


## How Are Radiosonde Data Used?

Understanding and accurately predicting changes in the atmosphere requires adequate observations of the upper atmosphere. Radiosonde observations are the primary source of upper-air data and will remain so into the foreseeable future.

Radiosonde observations are used in many ways, which include:

- Input for computer-based weather prediction models
- Local severe storm, aviation, and marine forecasts
- Weather and climate change research
- Input for air pollution models
- Ground truth for satellite data





# CONGRATULATIONS!



**By attending this event, you have earned My Own “Weather” Badge at the National Weather Service Green Bay’s “Scout Day”.**

Now you need to create your badge!

Go to: <https://www.gsmakeyourown.com/>



**Name of Badge:** \_\_\_\_\_

**What I learned about weather while earning this badge?**

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**Cost: \$3.50 - Girls under 13 need a parent to help register**

# **Useful Weather Internet Sites**

## **National Weather Service sites:**

National Weather Service - <http://www.weather.gov/>

National Weather Service Green Bay - <http://www.crh.noaa.gov/grb/>

North Central River Forecast Center - <http://www.crh.noaa.gov/ncrfc/>

Storm Prediction Center - <http://www.spc.noaa.gov/>

National Hurricane Center - <http://www.nhc.noaa.gov/>

## **Radar Imagery:**

KGRB – covers all of NE Wisconsin - <http://radar.weather.gov/radar.php?rid=grb>

Central Great Lakes - <http://radar.weather.gov/Conus/centgrtlakes.php>

National Mosaic - <http://radar.weather.gov/Conus/index.php>

Location of all NWS radars - <http://radar.weather.gov/>

## **Satellite Imagery:**

Wisconsin Visible Satellite - [http://www.crh.noaa.gov/grb/?n=wi\\_sat](http://www.crh.noaa.gov/grb/?n=wi_sat)

Midwest Visible Satellite - [http://aviationweather.gov/adds/data/satellite/latest\\_MSP\\_vis.jpg](http://aviationweather.gov/adds/data/satellite/latest_MSP_vis.jpg)

Midwest Infrared Satellite - [http://aviationweather.gov/adds/data/satellite/latest\\_MSP\\_irbw.jpg](http://aviationweather.gov/adds/data/satellite/latest_MSP_irbw.jpg)

Other satellite images - <http://www.crh.noaa.gov/grb/?n=satellite>

## **Surface Observations:**

Weather Observations for the U.S. - <http://weather.noaa.gov/>

## **Weather Maps:**

Wisconsin Surface Map - [http://www.crh.noaa.gov/images/grb/maps/wi\\_sfc.gif](http://www.crh.noaa.gov/images/grb/maps/wi_sfc.gif)

Midwest Surface Map - [http://www.crh.noaa.gov/images/grb/maps/midwest\\_sfc.gif](http://www.crh.noaa.gov/images/grb/maps/midwest_sfc.gif)

Midwest Analyzed Surface Map - <http://www.hpc.ncep.noaa.gov/sfc/namncsfcbwg.gif>

Hydrometeorological Prediction Center - <http://www.hpc.ncep.noaa.gov/>

Current National Analysis - <http://www.hpc.ncep.noaa.gov/noaa/noaa.gif>

Forecast Maps Days 1 & 2 - [http://www.hpc.ncep.noaa.gov/basicwx/basicwx\\_wbg.php](http://www.hpc.ncep.noaa.gov/basicwx/basicwx_wbg.php)

Forecast Maps Days 3-7 - [http://www.hpc.ncep.noaa.gov/basicwx/basicwx\\_wbg.php](http://www.hpc.ncep.noaa.gov/basicwx/basicwx_wbg.php)

Code for Surface Fronts - <http://www.hpc.ncep.noaa.gov/html/fntcodes2.shtml>

## **Other:**

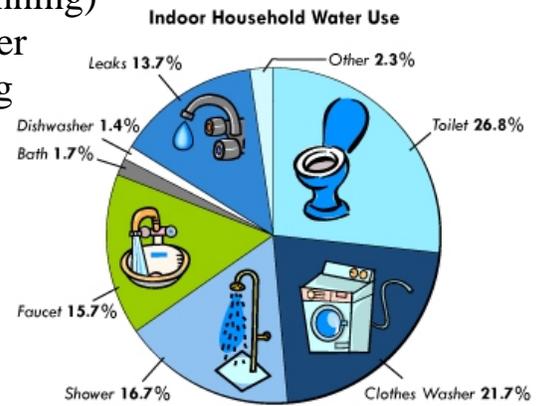
National Weather Service Glossary - <http://www.weather.gov/glossary/>

Cloud Chart - <http://www.weather.gov/os/brochures/cloudchart.pdf>

# Every Drop Counts!

## Conservation = use only what you need

- ◆ Water your lawn at night or in the early morning (8pm – 6am)
- ◆ Don't water when it is windy
- ◆ Apply mulch or bark around shrubs and trees to help retain moisture in the soil
- ◆ Plant trees and plants that need little watering
- ◆ Wash your car and bicycle with a bucket and sponge
- ◆ Take short showers - 4 minutes max (Take a 'Navy' shower")
- ◆ Collect rainwater in a bucket and use it to water houseplants
- ◆ Only run the dishwasher and clothes washer with full loads
- ◆ Wash and rinse dishes by hand in sink (tap not running)
- ◆ Install an energy and water efficient clothes washer
- ◆ Keep a jug of water in the refrigerator for drinking
- ◆ Install a low-flow shower head
- ◆ Sweep with a broom, not a hose
- ◆ Check for leaky faucets and toilets
- ◆ Turn off the faucet when brushing your teeth



Source: Awwa Research Foundation (1999)

### Common Water – Use Habits

	Typical Usage	Water-Saving Habits
Showering	25-50 gallons (3-5 gal/min)	Take a 'Navy' shower. Wet down, soap up, rinse off (5 gal.)
Tub Bathing	35 gallons full	Use low level (10-12 gallons)
Toilet Flushing	4 gal/flush; (avg 5 flushes /day per person)	Install low flush toilet (1.6 gal/flush) or use tank displacement devices
Teeth Brushing	2-3 gallons* (tap running)	Wet brush; rinse briefly (1 pint)
Hand Washing	3-6 gallons* (tap running)	Fill basin; rinse (1 gallon)
Shaving	5-10 gallons* (tap running)	Fill basin; rinse (1 gallon)
Dishwashing	7-11 gal/load (full cycle dishwasher)	Wash; rinse in sink (5 gallons); Use paper plates; install high efficiency dishwasher < 7gal/load
Clothes Washer	40-50 gal/load for top loading machine	Do only full loads, front loading machines average 27 gal/load
Outdoor Watering	5-10 gal/minute	Be sensible; water at night or early morning, don't over water, mulch ground to retain moisture

\* Faucet use based on average flow of 2 to 3 gallons per minute.