Name: _____Unit 3: Weather, Climate & The Atmosphere NOTES: 3.08

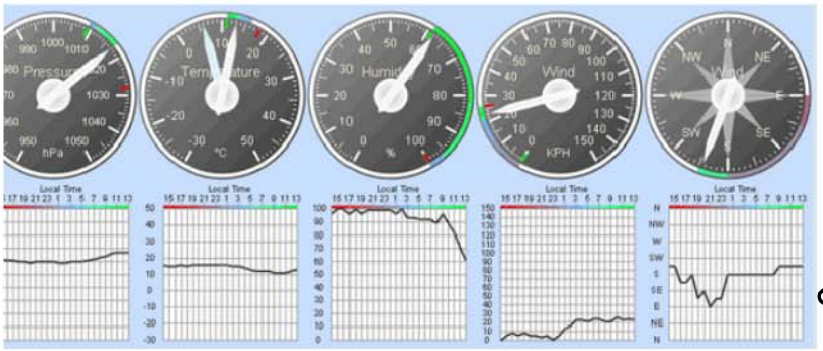
FOCUS: Weather Technology

ESSENTIAL QUESTION: Can you describe the types of technology that are used by meteorologists to monitor the atmosphere and predict weather?

What do you already know?

- A complete report of weather includes a description of temperature, humidity, air pressure, precipitation, cloud coven, & wind speed/direction
- Meteorologists at NOAA (National Oceanic & Atmospheric Administration) collect data from over 300 weather stations daily to produce weather maps across the country.

Meteorology



- ***Meteorology is*** the study of the entire atmosphere including weather conditions in the troposphere
- In order to accurately predict weather, meteorologists need a thorough understanding of:
  - How the atmosphere heats and cools
  - When and how cloud forms and produce precipitation
  - How air pressure changes and how this affects wind

Name: _____ Unit 3: Weather, Climate & The Atmosphere NOTES: 3.08

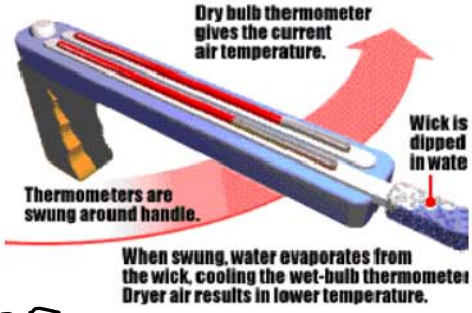
- Meteorologists use many different tools, both old and new, to gather data about conditions in the troposphere.

"Old-School" Tools of the Trade

- thermometer: a device that measures temperature, usually by the principle of thermal expansion since liquids, such as alcohol and mercury expand as they get warmer.

- Barometer: a device that measures air pressure
  - Mercury Barometer: consists of a well of mercury at the base of a calibrated vacuum tube.
  - Aneroid Barometer: consists of a flexible metal box made of copper and beryllium that expands and contracts with changes in pressure.
- Psychrometer: instrument used to measure moisture content in the air (humidity)

hygrometer



- rain gauge: instrument used to measure precipitation amounts

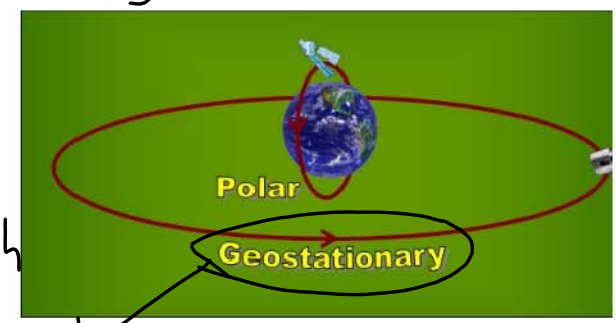
- anemometer: instrument used to measure wind speed
- Weather vane: instrument used to measure wind direction.

Name: _____ Unit 3: Weather, Climate & The Atmosphere NOTES: 3.08

Satellites

- NOAA operates several types of satellites that collect data to be shared with meteorologists and news services across the country.

- Satellites can be very useful in collecting data about:
  - Weather Systems: clouds, temperature changes, pressure systems
  - Ocean health: water temperatures, algae growth, fish populations, monitoring coral reefs.
  - Tropical Storms & Hurricanes: (speed, location, trajectory)
  - Unique Weather Events: forest fires, Smog & Smoke, Volcanic Ash, floods, dust storms, icebergs.



- Two types of NOAA satellites:
  - Geosynchronous Satellites:
    - "Geo-" = Earth
    - "-sync" = to match in time
    - AKA: Geostationary Satellites

Name: _____ Unit 3: Weather, Climate & The Atmosphere NOTES: 3.08

- Revolves at the same rate that Earth rotates so they are constantly located 22,240 miles directly above the ~~United States~~ Equator.
  - Polar-Orbiting satellites:
    - Circle the Earth in a North-South orbit to provide atmospheric information about the entire globe.
    - Orbit 540 miles above Earth.

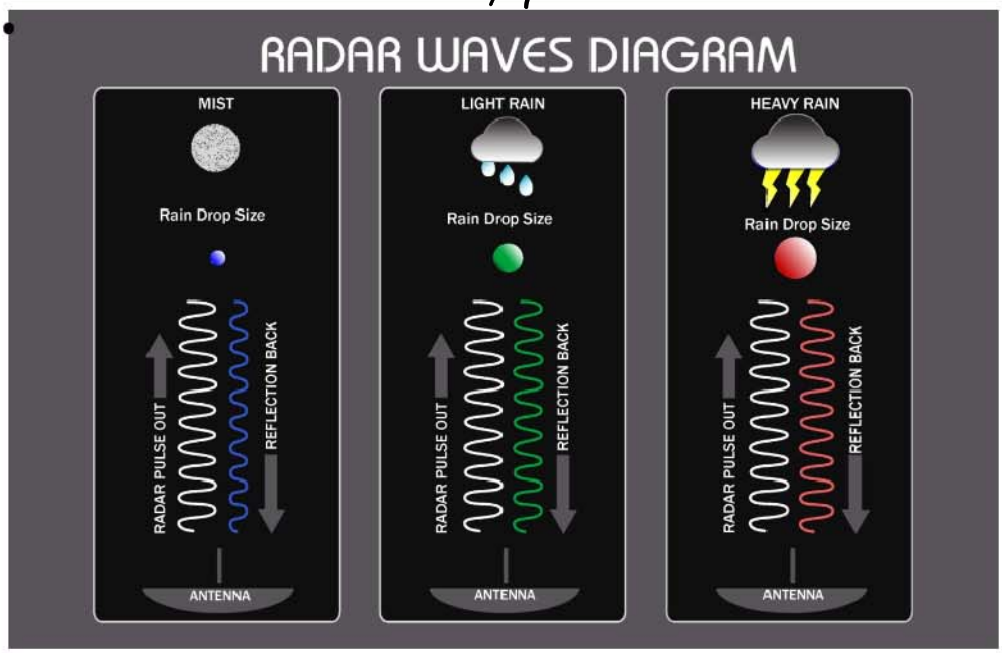
Radar (AKA: Doppler Radar)

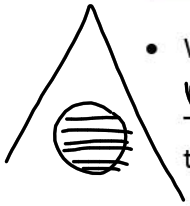
- ***Radar is***: a system that uses electromagnetic waves for detecting the presence, direction, distance, and speed of objects.
  - Objects include aircrafts, ships, missiles, etc.

- Stands for RAdio Detection And Ranging.
- Weather applications discovered by accident during WWII when naval radar operators noticed interference on their readings caused by storms.

Name: _____Unit 3: Weather, Climate & The Atmosphere NOTES: 3.08

- Most often used to locate precipitation, calculate its motion, and estimate its type (rain, snow, hail).
-





- Works by sending out radio waves and then "listening" for their return to determine if precipitation is moving toward or away from the radar station and the type of droplets.