



# **Weather Or Not!**

**Georgia Science Olympiad**



# Science Olympiad



**Part I: In this section, you will explore air masses, fronts, and weather stations. Use the student sheet to record your answers.**

1. What is an [air mass](#)?
2. Describe the temperature, moisture and air pressure associated with a [Continental Polar air mass](#).
3. Describe the temperature, moisture and air pressure associated with a [Maritime Tropical air mass](#).
4. Describe a [high pressure center](#). What is another name for a center of high pressure?
5. Watch this [animation](#) on how winds flow around cyclones (pressure lows) and anticyclones (pressure highs) in the Northern Hemisphere. Draw and describe what you observe.
6. What is a [cold front](#)? Describe the characteristics before, during and after a cold front below.
7. Individual surface weather stations use a standard format to report data. Review the [weather stations symbols](#) for temperature, weather symbol, dew point, cloud cover, sea level pressure and wind. Draw and label the station symbol in this example.



# Science Olympiad



**Part II: In this section, you will explore weather forecasts.**

1. What is the importance of temperature in the formation of [rain](#), [freezing rain](#), [sleet](#) or [snow](#)? (draw the diagram shown with freezing rain, sleet, and snow)
2. What is a [Supercell Storm](#)? What dangerous conditions may develop during supercell storms? What wind and cloud conditions are prevalent in supercell storms?
3. What is the “[Jet Stream](#)” and at what altitude is the jet stream measured?
4. Describe the “[trends](#)” method of forecasting. What factors does a meteorologist using the trends method consider?
5. If a line of thunderstorms is located 60 miles to your northwest and moving southeast at 30 miles per hour, how long will it take to reach your location? Show your calculation.
6. [Hurricanes](#) are formed from thunderstorms. What 2 criteria must be met for a hurricane to develop from a thunderstorm?



# Science Olympiad



**Part III: In this section, you will explore tornadoes and run a tornado simulation.**

Click on this link to open the [Tornado Simulator](#).

1. You can manipulate the tornado diameter and pressure differential. Which factor has the most influence on the amount of damage done?
2. What is the Enhanced Fujita Scale?
3. What characteristics constitute a EF3 tornado?
4. What is the highest Fujita Scale score you can make with the tornado simulator?



# Science Olympiad



**Part IV: In this section, you will explore lightning and run a lightning simulation.**

Click on this link to open the [Zap Game: Make Your Own Lightning](#). Use [this document](#) to help you play the game.

1. What type of precipitation causes charges to separate in clouds?
2. What is the difference between cloud to ground and intra-cloud lightning?
3. What keeps the precipitation in clouds?
4. What is your highest score in the simulation?

Elementary



Science Olympiad

# Science Olympiad



**Weather Resources:** You can explore these weather resources on your own to learn more about weather and weather forecasting.



[SciJinks](#) is a fun weather resource from NOAA (National Oceanic & Atmospheric Administration). There are games, videos, and more!



[WeatherWizKids](#) is a website for kids fascinated by weather! Its run by a meteorologist especially for children. Loads of info and experiments to try at home!



[Climate Kids](#) is a resource from NASA with activities, games, and more! Click on the “mystery” button for a random activity to try.



## TEACHER KEY

# Weather or Not 2021

## Student Sheet

**Name:** \_\_\_\_\_

### *Part I*

1. What is an air mass?

An air mass is a large body of air that has similar temperature and moisture properties throughout.

2. Describe the temperature, moisture and air pressure associated with a Continental Polar air mass.

Very cold air, low moisture, high pressure

3. Describe the temperature, moisture and air pressure associated with a Maritime Tropical air mass.

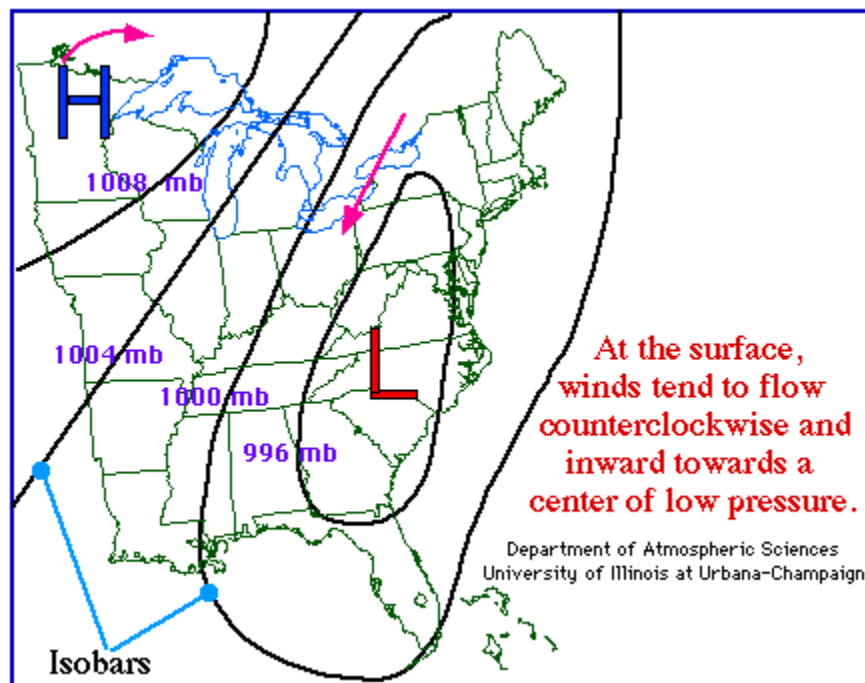
Warm air, high moisture, low pressure

4. Describe a high pressure center. What is another name for a center of high pressure?

A high pressure center is where the pressure has been measured to be the highest relative to its surroundings. High pressure centers are also known as anticyclones.

5. Watch this animation on how winds flow around cyclones (pressure lows) and anticyclones (pressure highs) in the Northern Hemisphere. Draw and describe what you observe below.

Winds flow clockwise around a high pressure center in the northern hemisphere, while in the southern hemisphere, winds flow counterclockwise around a high.



Animation by: [Hall](#)

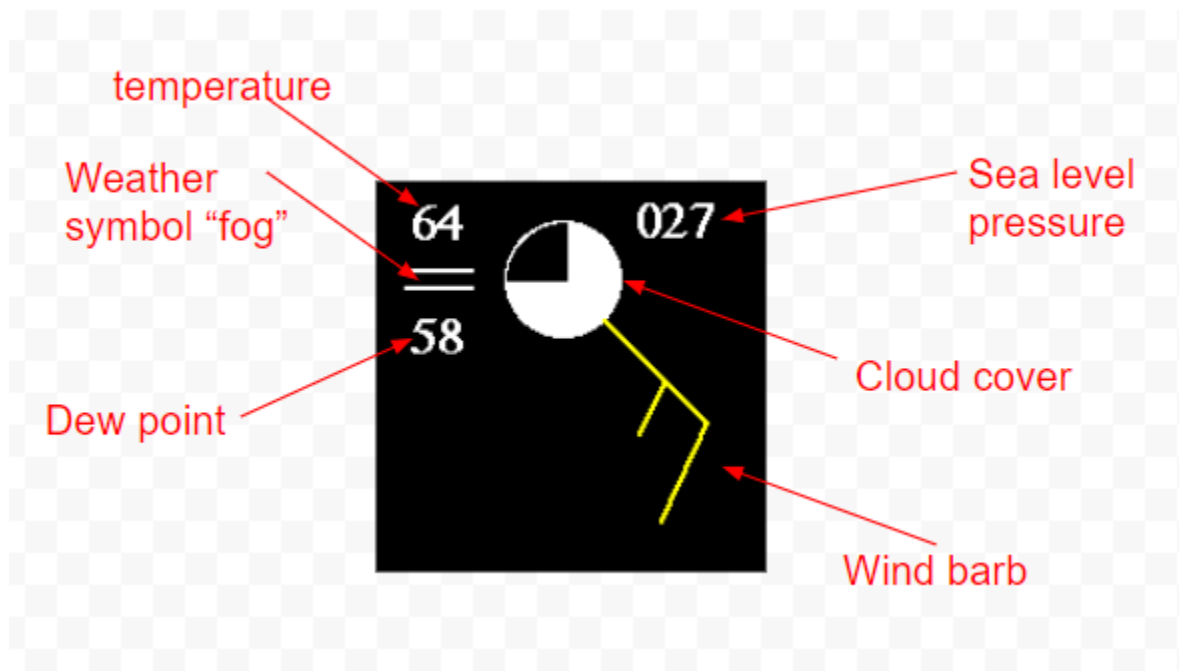


6. What is a cold front? Describe the characteristics before, during and after a cold front below.

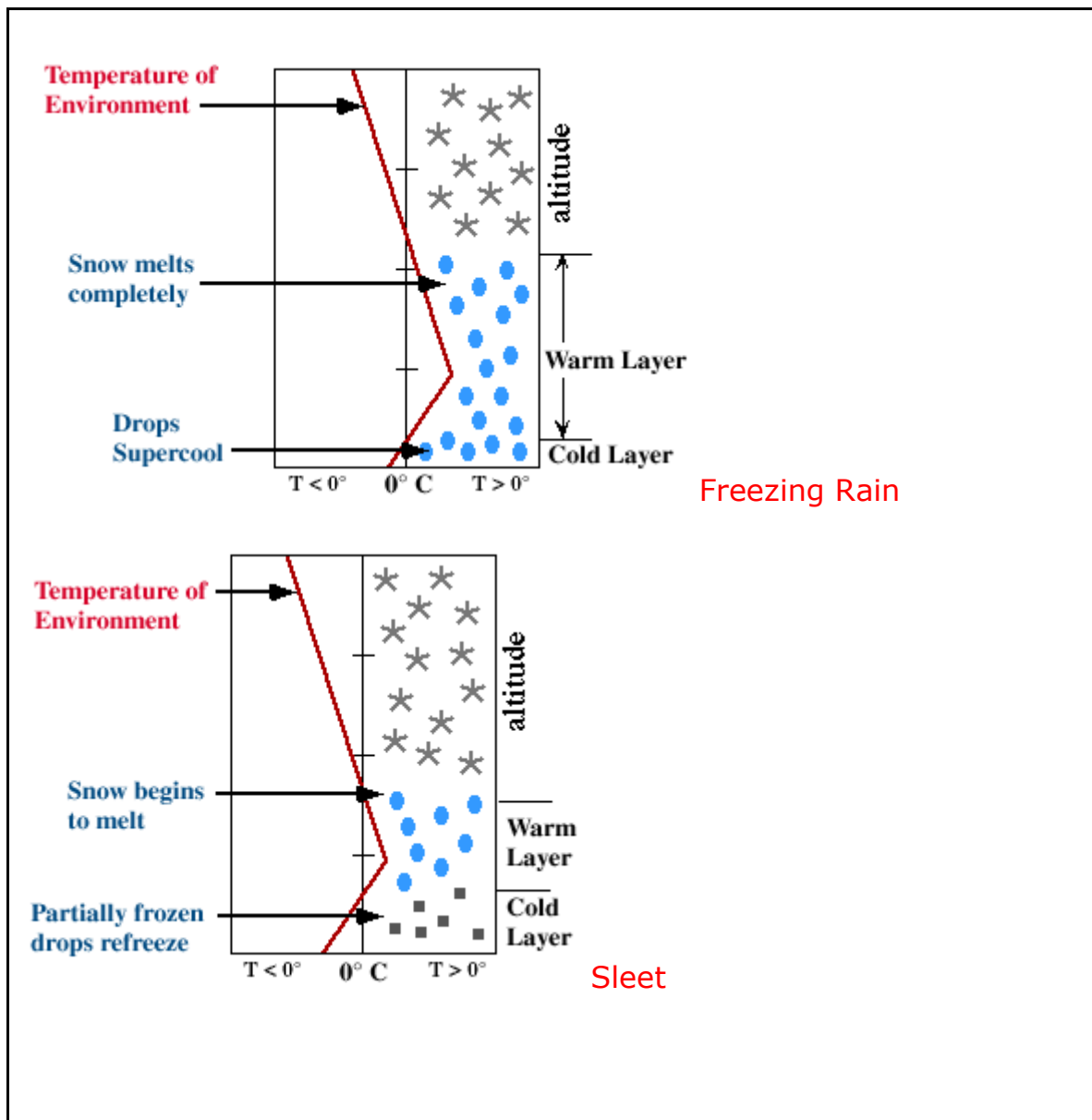
A cold front is defined as the transition zone where a cold air mass is replacing a warmer air mass. Cold fronts generally move from northwest to southeast. The air behind a cold front is noticeably colder and drier than the air ahead of it. When a cold front passes through, temperatures can drop more than 15 degrees within the first hour.

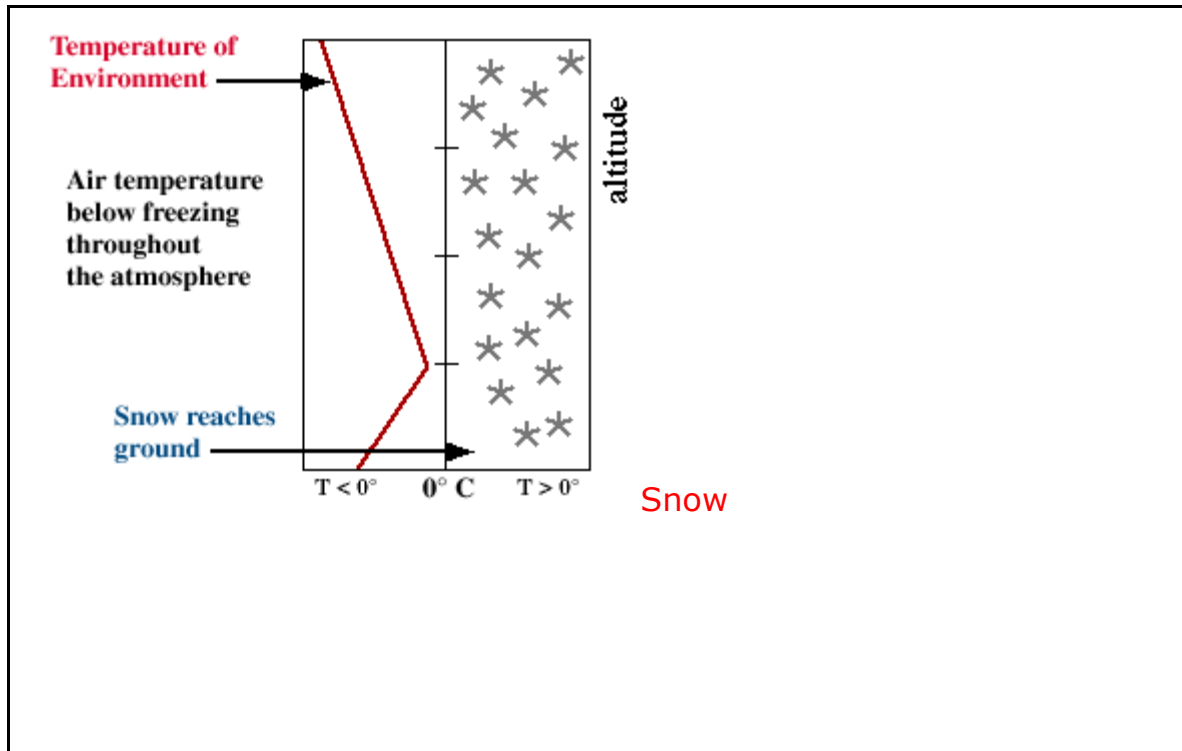
Before	During	After
<p>Winds: south-southwest</p> <p>Temp: warm</p> <p>Pressure: falling steadily</p> <p>Clouds: increasing: <u>Ci</u>, <u>Cs</u> and <u>Cb</u></p> <p>Precip: short period of showers</p> <p>Visibility: fair to poor in haze</p> <p>Dew point: high; remains steady</p>	<p>Winds: gusty; shifting</p> <p>Temp: sudden drop</p> <p>Pressure: minimum, then sharp rise</p> <p>Clouds: <u>Cb</u></p> <p>Precip: heavy rains, sometimes with hail, thunder and lightning</p> <p>Visibility: poor, followed by improving</p> <p>Dew point: sharp drop</p>	<p>Winds: west-northwest</p> <p>Temp: steadily dropping</p> <p>Pressure: rising steadily</p> <p>Clouds: <u>Cu</u></p> <p>Precip: showers then clearing</p> <p>Visibility: good, except in showers</p> <p>Dew point: lowering</p>

7. Individual surface weather stations use a standard format to report data. Review the weather station symbols for temperature, weather symbol, dew point, cloud cover, sea level pressure and wind. Draw and label the station symbol in this example.



1. What is the importance of temperature in the formation of rain, freezing rain, sleet or snow? Temperature at different levels of the atmosphere determines the type of precipitation that makes it to the ground. (draw the diagram shown with freezing rain, sleet, and snow)





2. What is a Supercell Storm? What dangerous conditions may develop during supercell storms? What wind and cloud conditions are prevalent in supercell storms? A supercell is a thunderstorm with a deep rotating updraft (mesocyclone). Extreme weather can result from supercells. Rotating winds with anvil shaped clouds are present in a supercell storm.

3. What is the "Jet Stream" and at what altitude is the jet stream measured? The jet stream is a current of fast moving air found in the upper levels of the atmosphere. It is measured between 10-15 km (6-9 miles) in altitude.

4. Describe the "trends" method of forecasting. What factors does a meteorologist using the trends method consider?

The trends method involves determining the speed and direction of movement for fronts, high and low pressure centers, and areas of clouds and precipitation. Using this information, the forecaster can predict where he or she expects those features to be at some future time. For example, if a storm system is 1000 miles west of your location and moving to the east at 250 miles per day, using the trends method you would predict it to arrive in your area in 4 days.

5. If a line of thunderstorms is located 60 miles to your northwest and moving southeast at 30 miles per hour, how long will it take to reach your location? Show your calculation.

$$60 \text{ miles} \times \frac{1 \text{ hour}}{30 \text{ miles}} = 2 \text{ hours}$$

6. Hurricanes are formed from thunderstorms. What 2 criteria must be met for a hurricane to develop from a thunderstorm? The storm must be 1) over the ocean and 2) the water must be at least 26.5 degrees Celsius (81 degree Fahrenheit)

### *Part III*

1. You can manipulate the tornado diameter and pressure differential. Which factor has the most influence on the amount of damage done?

Pressure differential

2. What is the Enhanced Fujita Scale?

A scale that assigns a number to the damage created by a storm

3. What characteristics constitute a EF3 tornado?

136-165 mph winds, severe damage

4. What is the highest Fujita Scale score you made with the tornado simulator? *Answers will vary*

## *Part IV*

1. What type of precipitation causes charges to separate in clouds?

Ice crystals and snow pellets

2. What is the difference between cloud to ground and intra-cloud lightning?

Cloud to ground lightning travels from negative charges in the clouds to positive charges on the ground. For intra-cloud lightning, the charges travel between clouds.

3. What keeps the precipitation in clouds?

Wind known as updrafts keeps the snow and rain in the clouds.

4. What is your highest score in the simulation?

Answers will vary