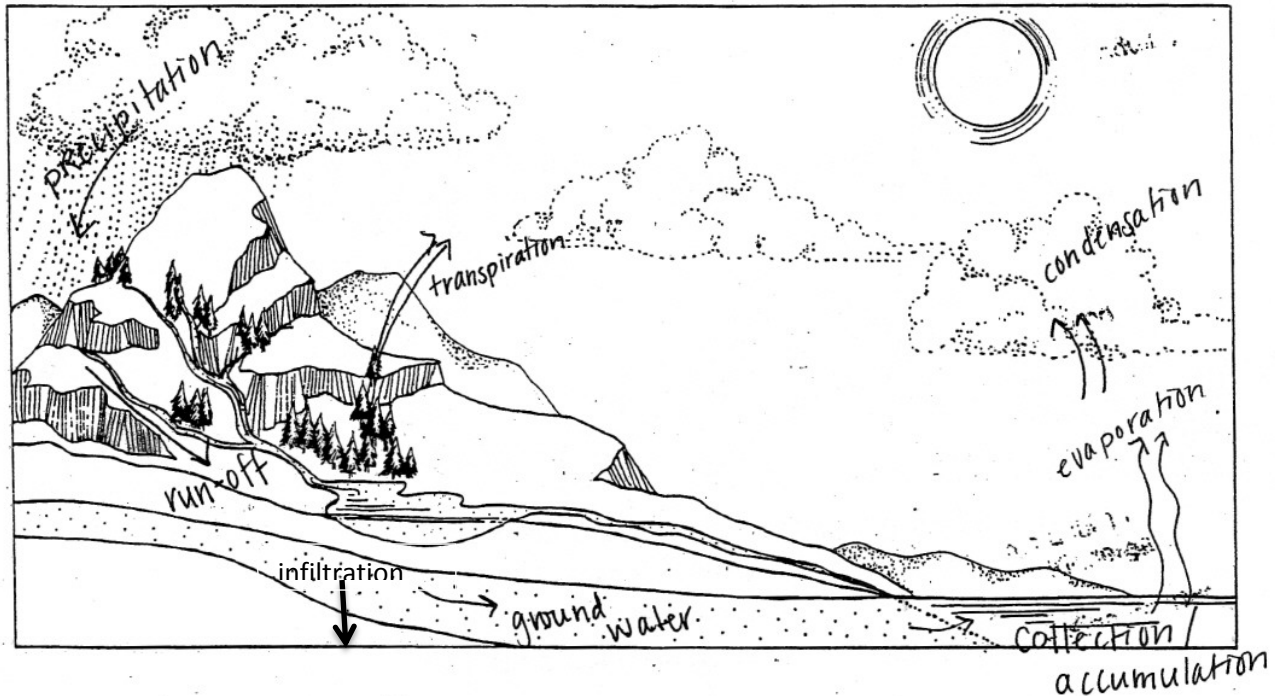


# Meteorology Study Guide

1. Label the following steps in the water cycle diagram. Be sure to include arrows to show the flow of water through the cycle.

- Transpiration    - Precipitation    -Evaporation    - Groundwater
- Condensation    - Runoff    -Accumulation/Collection    - Infiltration



2. Match the water cycle term to its description

- |   |   |
|---|---|
| <p><u>C</u> 1. Evaporation</p> <p><u>F</u> 2. Transpiration</p> <p><u>G</u> 3. Collection/Accumulation</p> <p><u>A</u> 4. Precipitation</p> <p><u>I</u> 5. Ground water</p> <p><u>B</u> 6. Condensation</p> <p><u>D</u> 7. Run-off</p> <p><u>H</u> 8. Infiltration</p> <p><u>E</u> 9. The Sun</p> | <p>A. Water that falls from the atmosphere to the Earth</p> <p>B. Water vapor changing from a gas to a liquid</p> <p>C. Water changing from a liquid to a gas</p> <p>D. Water that is not absorbed into the ground and moves to a lower elevation</p> <p>E. Drives the water cycle</p> <p>F. Water vapor released into the air by living things</p> <p>G. Water that is pooled into an area like a lake or ocean</p> <p>H. Water soaking into the soil</p> <p>I. Water located in the rocks under Earth's surface</p> |
|---|---|

3. List the 5 layers of the atmosphere in order. Star the layer that we live in.

Outer Space

\_\_\_ Exosphere \_\_\_\_\_

\_\_\_ Thermosphere \_\_\_\_\_

\_\_\_ Mesosphere \_\_\_\_\_

\_\_\_ Stratosphere \_\_\_\_\_

\_\_\_ Troposphere  \_\_\_\_\_

Earth

Try Studying More Than Everyone

4. Name the two most abundant gases in the atmosphere.

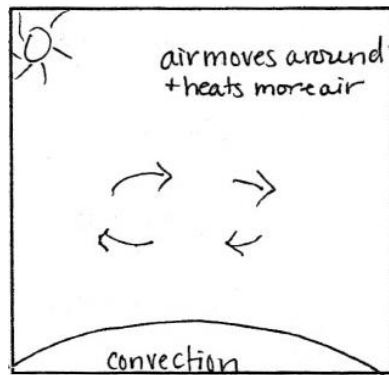
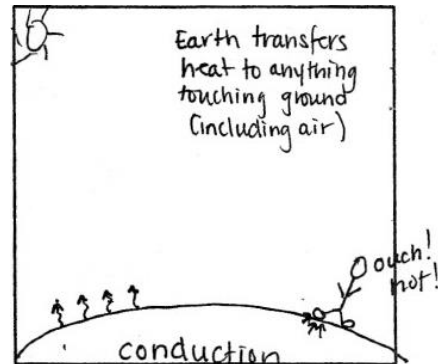
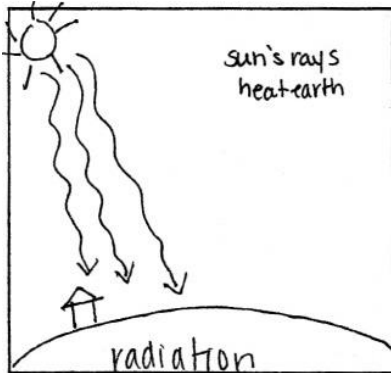
\_\_\_ Nitrogen and Oxygen \_\_\_\_\_

5. Write the layer of the atmosphere next to the description. (Some will be used more than once.)

Layer	Description
<u>Troposphere</u>	Layer that contains most of the air molecules in the atmosphere
<u>Mesosphere</u>	Coldest layer, found above the stratosphere
<u>Stratosphere</u>	Contains ozone
<u>Exosphere</u>	The fewest number of air molecules
<u>Troposphere</u>	Rain, clouds, snow
<u>Thermosphere</u>	The largest layer, very high temperatures

6. The ozone layer protects the Earth from what? \_\_\_ UV Rays \_\_\_\_\_

7. Draw 3 diagrams to show how radiation, convection, and conduction heat the Earth.  
**Be sure to include a brief explanation for each diagram.**



8. Label each description of heat transfer as Radiation, Conduction, or Convection:
- \_\_\_ **convection** \_\_\_ 1. A radiator (heater) heating a room
  - \_\_\_ **conduction** \_\_\_ 2. Your hand holding an ice cube
  - \_\_\_ **convection** \_\_\_ 3. Boiling a large pot of water
  - \_\_\_ **radiation** \_\_\_ 4. The seatbelts in a car getting hot on a sunny day
  - \_\_\_ **conduction** \_\_\_ 5. Cooking pancakes on a griddle

9. What is the difference between conduction and convection?

\_\_\_ **Conduction is the transfer of heat through DIRECT CONTACT. Convection is the flow or movement of a liquid or gas.** \_\_\_\_\_

10. Why can more water vapor be present in warm air than in cold air? (Hint, think about how the air molecules are spaced apart)

**Warm air expands, creating more space for the molecules. This expanded warm air allows more water vapor to be present than in constricted cold air.** \_\_\_\_\_

11. What causes air pressure? gravity.

12. As you are driving, you notice a fast moving convertible with a fabric top quickly passing your car. The fabric roof of the convertible is bulging up, as if air was getting under the roof. Describe how this relates to air pressure.

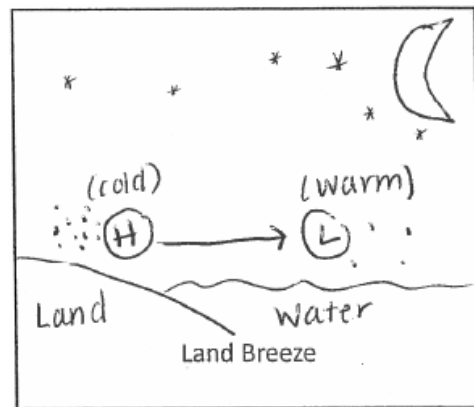
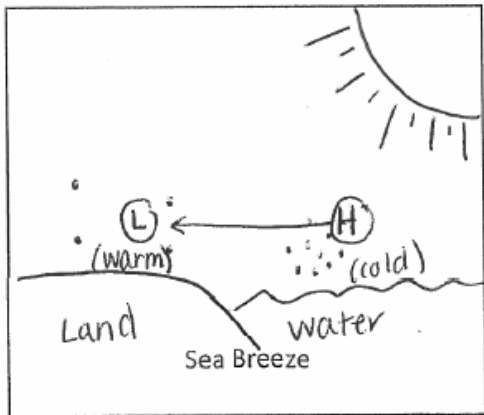
Air moves from an area of high pressure to an area of lower pressure. As the car moves fast it creates an area of low pressure above the roof of the car. The air that is inside the car (high pressure) will try to get to the lower pressure, pushing up on the material roof.

13. What is wind? The movement of air from an area of higher pressure to an area of lower pressure.

14. What causes sea breezes and land breezes?

Land heats up faster than water. The air over the water wants to move from an area of higher pressure (cooler air) to an area of lower pressure (warmer air) during the day. At night it is reversed because the land cools faster than water.

Include a diagram:



15. What causes global winds? The curve of our planet causes the uneven heating of the Earth's surface by the sun, which causes some areas to be warmer (have lower pressure) than others.

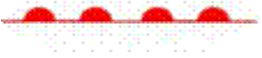



16. What are the doldrums? Windless zones near the equator

17. What are the jet streams? Narrow belts of wind in the upper troposphere.

18. What is the difference between a severe weather watch and a severe weather warning.

During a watch there is the potential for severe weather. During a warning severe weather is in the area.

19. Identify the front and weather.

Front	Weather	Symbol
Warm front	Light rain, can rain for extended periods. Warmer temps and clear skies follow	
Occluded front	Cooler temps and a lot of rain	
Cold front	Thunderstorms, heavy rain, cooler temps	
Stationary front	Light wind and precipitation	

20. Label the front.

Occluded front	A cold air mass moves towards a cool air mass with a warm air mass between them. The warm air mass gets pushed up.
Warm front	A warm air mass moves towards a cold air mass, and the warm air mass slides over the cold air
Cold front	A cold air mass moves towards a warm air mass and pushes the warm air up
Stationary front	A cold air mass and a warm air mass move next to each other and just stay there.

21. Write the correct letter next to each description. You may use a letter more than once and you may use more than one letter on a line.

- A. Cumulonimbus      B. Stratus      C. Cumulus      D. Cirrus

- D 1. Beautiful blue sky with wisps of high clouds  
C 2. Cotton puffballs, low altitude  
A 3. Thunderstorms, heavy rain  
B 4. Sky looks "whited out", there is no sun, but it isn't raining either.  
C, D 5. All cloud types that are not associated with precipitation

22. List 4 examples of severe weather.

Hail, Blizzard, Tornado, Hurricane, Thunderstorm.

23. What is the difference between a hurricane and a tornado? \_\_\_\_\_

A hurricane is a tropical storm that forms over warm oceans. A tornado is when a funnel cloud forms at the base of a cumulonimbus cloud and touches the ground.

24. A. If the humidity outside is 100%, what type of weather would you predict?

\_\_\_ **Cloudy with Rain**\_(Precipitation)\_\_\_\_\_

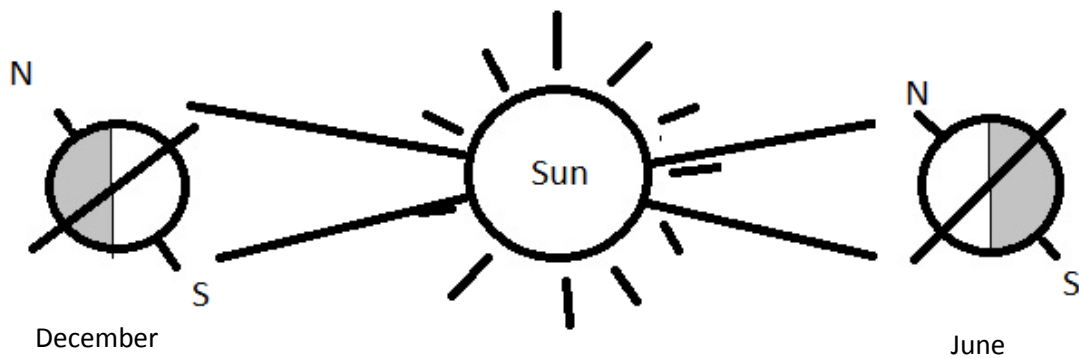
B. What if the humidity was 0%? \_\_\_ **Clear skies, no clouds.**\_\_\_\_\_

25. Name the tool that is used to measure the weather factor:

Temperature	<b>Thermometer</b>
Wind speed	<b>Anemometer</b>
Wind Direction	<b>Weather vane; Wind sock</b>
Air Pressure	<b>Barometer</b>

26. Why do we have seasons? \_\_\_ **Seasons are caused by the tilt of the Earth as it rotates around the sun. During our winter the northern hemisphere is tilted away from the sun, receiving less sunlight. During our summer, the northern hemisphere is tilted towards the sun receiving more sunlight.**\_\_\_\_\_

Draw a diagram:

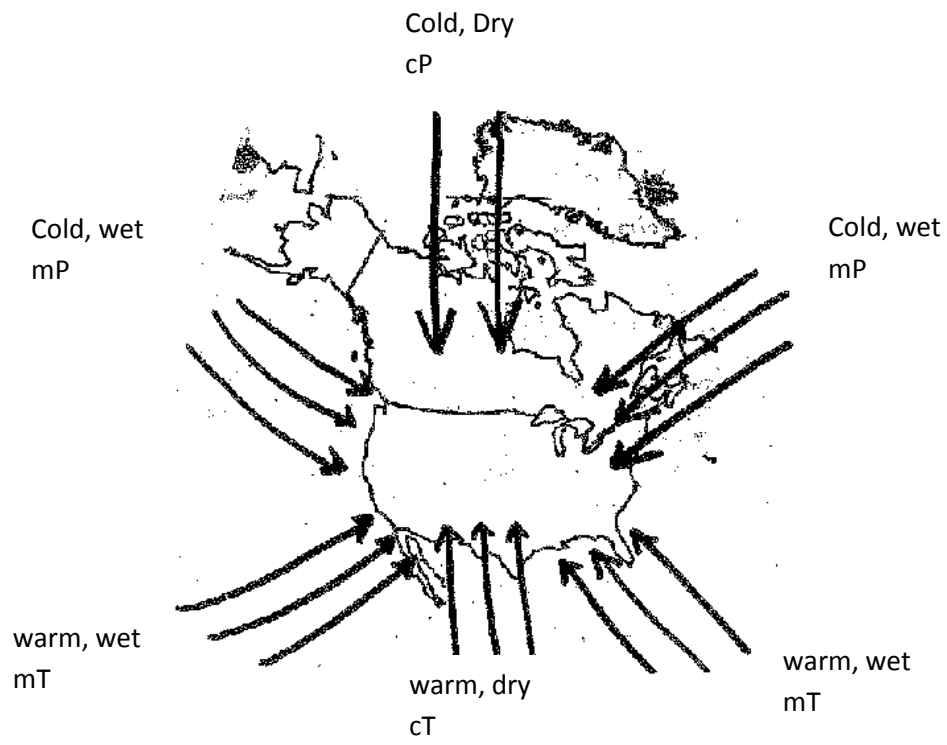


27. Describe the RELATIONSHIP between each word pair:

- a. air pressure/ air temperature : \_\_higher temperature (warm air) rises has lower pressure, causing it to rise. Colder temperatures have higher air pressure.\_\_\_\_  
\_\_\_\_\_
- b. humidity/ air temperature : \_\_warmer temperatures are able to hold more water vapor than lower temperatures.\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- c. fronts/ air masses : \_\_when 2 different air masses meet, a front is created.\_\_\_\_\_  
\_\_\_\_\_
- d. wind/ air pressure : \_\_wind is created when air moves from areas of high pressure to areas of low pressure.\_\_\_\_\_  
\_\_\_\_\_
- e. lightning/ thunder: \_\_thunder is the sound created by the rapid heating of the air around a lightning bolt.\_\_\_\_\_  
\_\_\_\_\_



28. Label each air mass with its 2 letter abbreviation and 2 word description.



29. Look at the table below. It shows the results of an experiment designed to study the effects of a fertilizer on tomato plants.

Effects of a Fertilizer on Tomato Plant Growth

Plant Group	Average Starting Height of Plants in Centimeters (cm)	Average Daily Sunlight Exposure in Hours (h)	Concentration of Fertilizer Used (%)	Average Height of Plants After 30 Days in Centimeters (cm)
W	4	10	0	23
X	4	10	8	26
Y	4	10	16	26
Z	4	10	24	20

A. Write a possible hypothesis for the experiment. If the amount of fertilizer given to a plant is increased then the plant will grow taller.

B. What was the dependent variable? Plant height

C. What was the independent variable? Concentration (amount) of fertilizer given to plants

D. What was the control group? Group W

# The Year there was No Summer

**Y**ou've seen pictures of erupting volcanoes. One kind of volcano sends smoke, rock, and ash high into the air above the crater. Another kind of volcano erupts with fiery, red-hot rivers of lava snaking down its sides. Erupting volcanoes are nature's forces at their mightiest, causing destruction and death. But not everyone realizes how far-reaching the destruction can be. Large volcanic eruptions can affect people thousands of kilometers away. In fact, major volcanic eruptions can have effects that reach around the globe.

An erupting volcano can temporarily change Earth's climate. The ash a volcano ejects into the atmosphere can create day after day without sunshine. Other particles move high into the atmosphere and are carried all the way around Earth, sometimes causing global temperatures to drop for several months.

## The Summer That Never Came

An example of a volcanic eruption with wide-ranging effects occurred in 1783 in Iceland, an island nation in the North Atlantic Ocean. Winds carried a black cloud of ash from an erupting volcano in Iceland westward across northern Canada, Alaska, and across the Pacific Ocean to Japan. The summer turned bitterly cold in these places. Water froze, and heavy snowstorms pelted the land. Sulfurous gases from the erupting volcano combined with water to form particles of acid that reflected solar energy back into space. This "blanket" in the atmosphere kept the Sun's rays from heating up part of Earth.

The most tragic result of this eruption was the death of many Kauwerak people, who lived in western Alaska. Only a handful of Kauwerak survived the summer that never came. They had no opportunity to catch needed foods to keep them alive through the following winter.

30. Identify the best main idea from the choices below.

- A. Many people died as a result of volcanic eruption in Iceland in 1783.
- B. Particles from an erupted volcano can travel great distances across the globe and cause problems for faraway areas.
- C. One of the devastating effects of volcanoes is a temporary change in the earth's climate, having many long-term effects globally.
- D. There are two types of volcanoes, one that sends smoke, rock, and ash high into the air, and another that sends red hot lava down the side of a mountain.

31. Why were many of the Kauwerak people killed as a result of the volcano eruption?

- A. They were killed by lava flow racing down the volcano and into the towns.
- B. They died in snowstorms when the summer was turned into winter by the blanket of ash blocking out the sun.
- C. They died next winter because without a summer they were unable to catch and store enough food.
- D. They were killed by a dense cloud of ash and sulfurous gases that were released by the volcano.

32. Use a colored pencil or marker to underline the evidence from the text that supports your answer to #31.