

Notes

Chapter 16: Weather Factors

Section 1: Energy in the Atmosphere

1. How does the atmosphere get energy in the form of radiation or WARMTH? _____

2. What do the molecules of Nitrogen and Oxygen do to visible light energy coming from the sun? _____
3. Why does this make the sky look blue rather and another color like pink or yellow? _____

4. What is the greenhouse effect? _____

Section 2: Heat Transfer

1. What is thermal energy? _____
2. What is temperature? _____
3. Use an example where you discuss the difference between heat and temperature _____

4. What tool measures temperature _____
 - a. How does this work? _____

5. What are the three ways heat is transferred?
 - a. _____
 - b. _____
 - c. _____
6. Explain radiation: _____
7. Explain Conduction: _____
8. Explain convection: _____

9. How is heat mainly moved around the atmosphere? _____

Section 4: Water in the Atmosphere

1. The amount of water vapor in the air is called _____
2. How much water vapor an air mass is CAPABLE of holding is called _____
3. How much water vapor the air is holding at any given point in time is called _____
4. How do you determine the relative humidity of air? _____

5. What tool measures relative humidity? _____
6. How do clouds form? _____
 - a. What is this process called? _____
 - b. The temperature of the air when this occurs is called the _____
7. What are the three basic types of clouds?
 - a. _____
 - b. _____
 - c. _____
8. Create one of each with your cotton balls

Stratus

Cumulus

Cirrus

9. What are some other types of clouds?
 - a. _____
 - b. _____

Section 5: Precipitation

1. Define precipitation _____

2. What are the 5 most common types of precipitation?
 - a. _____:define: _____

 - b. _____:define: _____

 - c. _____:define: _____

 - d. _____:define: _____

 - e. _____:define: _____



CLOUDS!

Discuss with your "eye buddy" what you think humidity is: create your own definition below: use the terms water vapor and air in your definition if you can.

What does relative humidity compare? What example did we discuss in class?

Come up with your own analogy for relative humidity

How are condensation and dew point related?

List the three primary types of clouds and draw a picture of each type. Work with your "shoulder buddy" to get a drawing that is as accurate as possible

1.

2.

3.

What does the word "nimbo" mean?

Create a **cirrus** cloud out of cotton balls

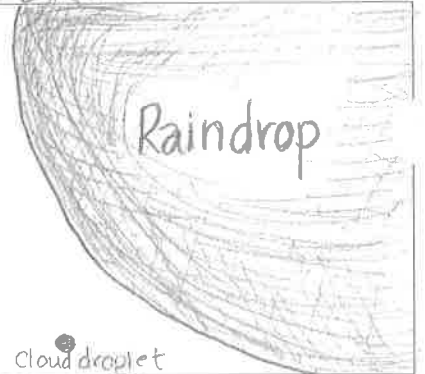
Create a **cumulus** cloud out of cotton balls

Create a **stratus** cloud out of cotton balls

Write a total of 4 similarities and differences between the three types of clouds

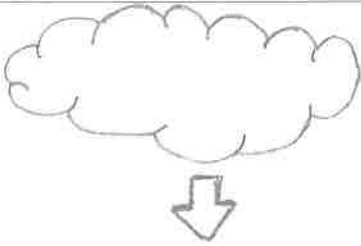
SIZE MATTERS!

Precipitation: come up with a working definition of this term: use examples in your definition

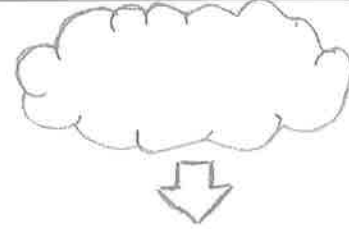


cloud droplet

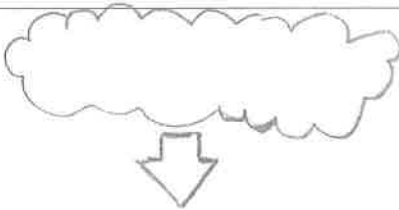
Rain:



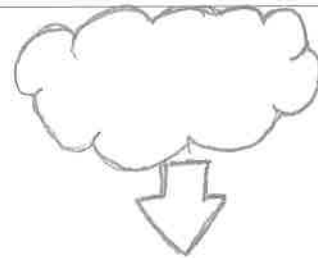
Freezing rain



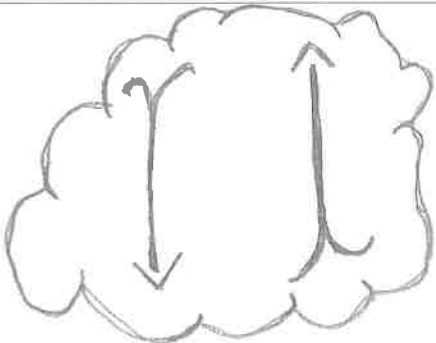
Sleet



Snow



Hail



Even though hail and snow are both solids in the cloud, in the air and when they hit the ground, give at least 3 reasons they are so different

What tool measures precipitation?

Explain your thoughts about controlling precipitation

What is a drought?



When it's really windy outside, what do you think is **moving your hair**? What do you **feel on your face**?
Discuss this with your "eye buddy" and write down **3 lines** of the best answer you come up with



When a balloon is filled with air and untied, what will happen if you let go of the end?

Draw the balloon and which way the air is going here:

Winds form the same way. It has to do with **pressure differences**. **Air pressure** can be defined as *how many air molecules are pushing on something*. The more molecules, the greater the pressure, the fewer the molecules, the less the pressure

Discuss with your "eye buddy" where the high pressure is when thinking about a balloon: The air inside the balloon, or the air outside the balloon: Write down what you discussed here: Include why you think so! 😊

In the last chapter we learned that certain environmental conditions have an effect on air pressure. Most of the time its differences in temperature...remember crushing the can with our minds?
DISCUSS the lab we did with your table. See if you can remember what temperature created **low pressure (fewer molecules)** and what temperature created **high pressure (more molecules)**
In **3 lines** write what you remember about air pressure and temperature:

Let's do a lab!!!
😊



Why Winds Whirl Worldwide

Objective: The objective of this activity is to investigate how pressure differences create wind.

Materials: 1 balloon
string
drinking straw
tape

Procedure:

1. Thread the string through the straw.
2. Tie each end of the string to chairs or hold one end yourself and have someone else hold the other end.
3. Blow up the balloon but do not tie it.
4. With the another student, tape the balloon to the straw.
5. Pull the string tight and move the straw to one end of the string with the untied end facing you.
6. Let go of the balloon and observe what happens. Record your observations in the box marked Trial 1.
7. Repeat the process and record your observations in the box marked Trial 2.

Data

Trial 1	
Trial 2	

Questions

1. Describe what happened to the air in the balloon when it was released. Why did this happen?

2. How is what you did in this activity similar to what happens when wind is created? How is it different?

3. How would the size or shape of the balloon affect your results? Why?

4. Write a statement about air pressure and wind.

5. Describe a situation when there is no wind.



LAB: What's the Recipe for a Cloud?

name: _____

Pre-lab Questions:

1. Why would there be more humidity in the air above a warmer lake than there would be above a colder lake?
2. In order for a cloud to form, the humid air must be cooled below its _____ point.
Circle one.
 thermal condensation dew
3. As air is compressed (squeezed), will it become warmer, or will it become cooler?
4. As air rises, will it be compressed, or will it expand? How will this affect its temperature?
5. What are "condensation nuclei"? Give two examples.

Materials: untinted 2 liter plastic bottle with lid, book of matches, 12 oz. Styrofoam cup (or similar container), funnel (optional), hot water, ice water

Procedures/Observations:

1. Trial #1: Fill the cup near the top with cold water and then pour it into the plastic bottle. Use a funnel if one is available. Firmly screw on the lid. Shake the bottle vigorously for 30 seconds. Squeeze the bottle for several seconds to increase the pressure, and then release it to allow the air inside to expand. Squeeze and release several times as you watch the air in the bottle.

observations: _____

2. Trial #2: Unscrew the cap from the bottle. Light a match, blow it out, and then hold the smoking match inside the tilted bottle for about 2 seconds. Quickly replace the cap. Squeeze and release as you did in procedure #1.

observations: _____

3. Trial #3: Empty the cold water from the bottle, and pour (use funnel) a cup of very hot tap water into it. Replace the cap, and shake the bottle for 30 seconds. Squeeze, release, and observe.

observations: _____

4. Trial #4: Unscrew the cap, and hold a match into the bottle as you did in procedure #2. Quickly replace the cap, and then squeeze, release, and observe.

observations: _____

Follow-Up Questions:

1. Which of your four trials resulted in the best cloud formation?
2. Was cloud formation more impressive when smoke particles were present in the bottle?
3. Did the cloud appear when you caused high pressure on the air in the bottle (by squeezing), or when you caused low pressure (by releasing)?
4. Which provided more vapor in the bottle . . . the hot water, or the cold water?
5. Based on your findings, what is the recipe for cloud formation? (circle 3)
cooling caused by high pressure; compression particles (smoke, dust, etc.)
cooling caused by low pressure; expansion water vapor
6. In your experiment, what served as the "condensation nuclei"?
7. Why did the cloud disappear when you squeezed the bottle? **You must use the term "dew point" in your answer.**
8. You can see clouds because they are made of _____ or _____. Circle two.
water vapor water droplets ice crystals
9. Circle the letters of the five situations listed below that would contribute to cloud formation.
 - A. Moist air is forced upward as it encounters the Cascade Mountain Range.
 - B. Tomorrow's forecast calls for an area of high pressure to be centered over your region.
 - C. The westerlies cause air to flow down the east side of the Rockies into Cut Bank, Montana.
 - D. During the afternoon, air over a large air force base begins to rise because it is so much hotter than air over the surrounding forest.
 - E. In autumn, the Santa Ana winds blow down from the mountain slopes of interior California out to the sea.
 - F. Intensely heated air over the equator rises in an area called the intertropical convergence zone.
 - G. As part of the global circulation pattern, air 30 degrees north of the equator is sinking in an area called the horse latitudes.
 - H. An intense low pressure system moves across the Midwest.
 - I. A cold air mass from Canada pushes into a mass of warm humid air over Nebraska.
10. How do particles such as smoke or dust help clouds form? (What is their role?)

winds

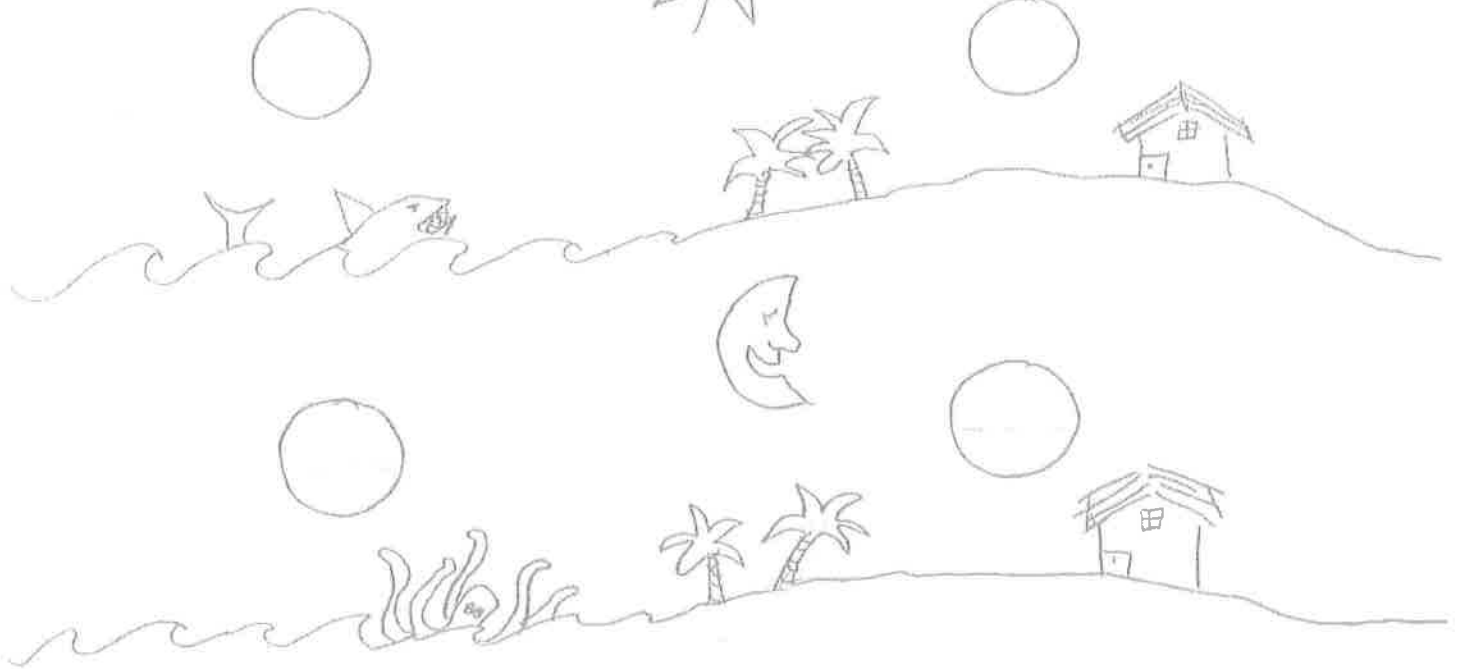
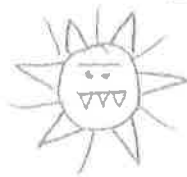


_____ = Temp

_____ = temp

_____ = pressure

_____ = pressure



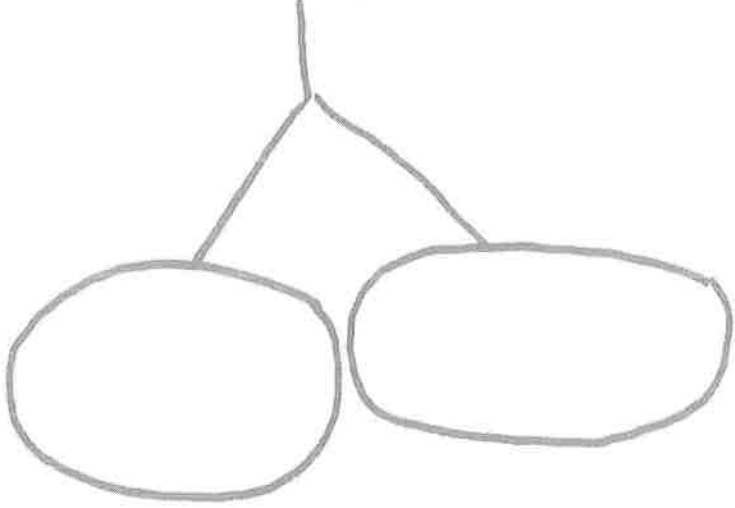
- ★ landbreezes blow at _____
- ★ Seabreezes blow during the _____
- ★ winds always blow from _____ to _____ pressure



Include

Local Winds

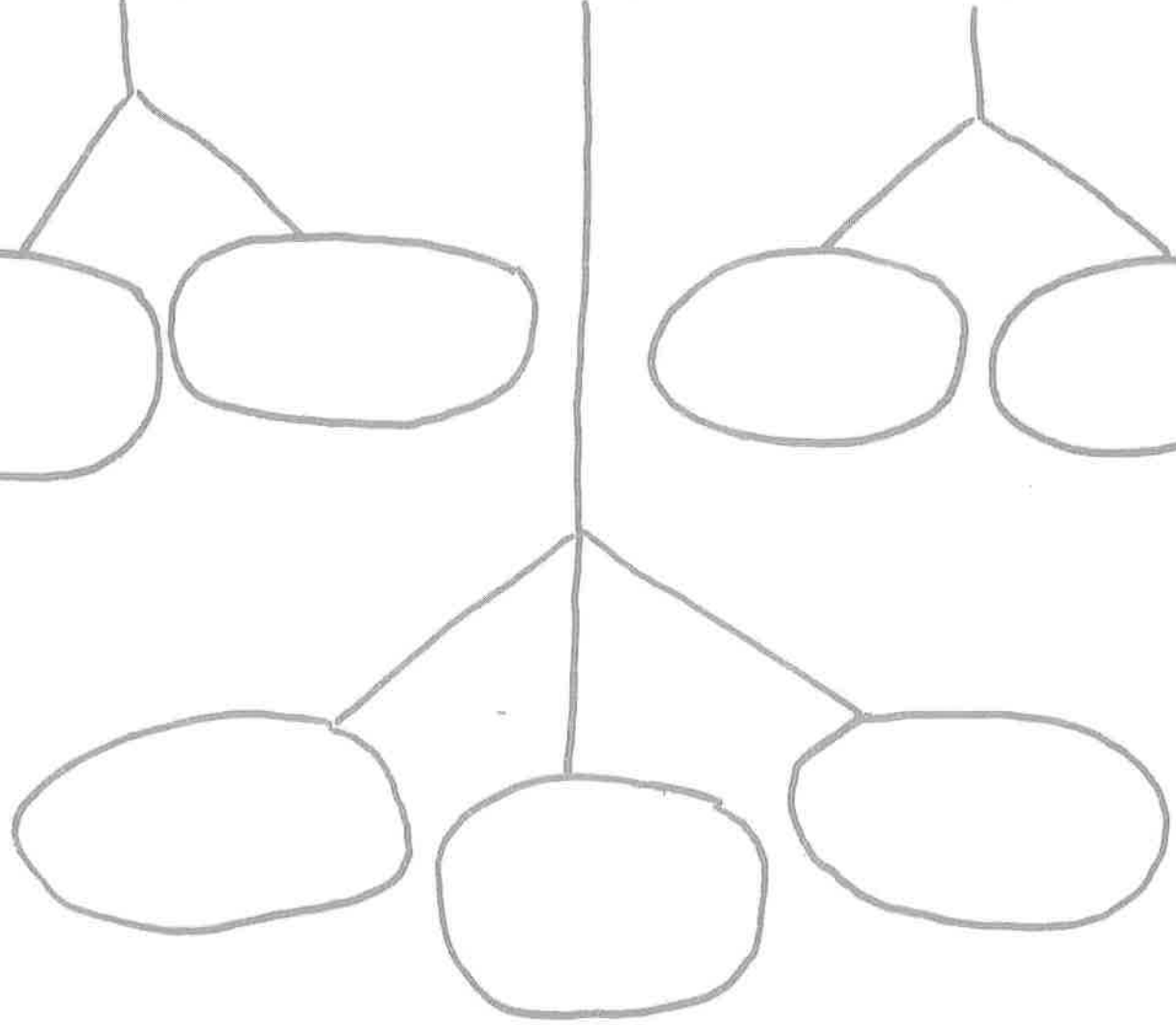
Two types



Include

Global Winds

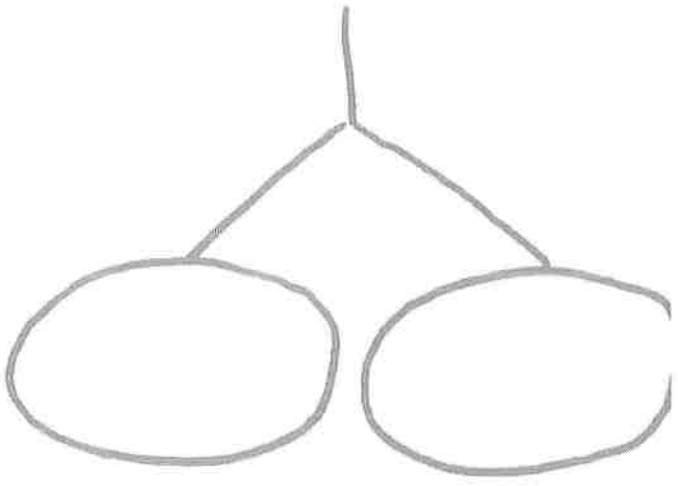
Three types



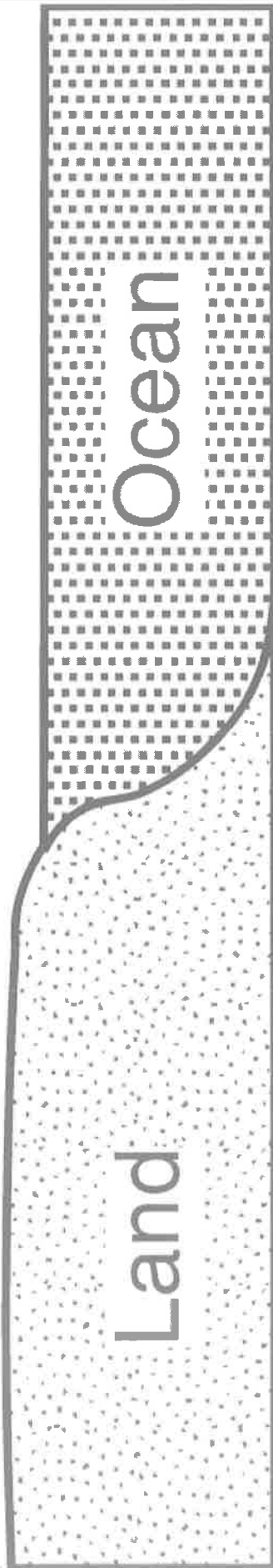
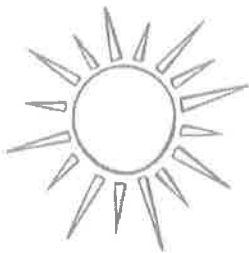
Include

Monsoon

Two types



SEA BREEZE



Chapter 16 study guide

1. What wavelengths are longer than visible light?
2. What wavelengths are shorter than visible light?
3. How is wavelength measured?
4. Why does the sky look blue?
5. What is the greenhouse effect?
6. How is air temperature measured?
7. How is wind speed measured?
8. What is the difference between heat (kinetic energy) and temperature?
9. What tool tells you wind direction?
10. How are all winds named?
11. What are the three types of heat transfer?
12. Explain the three types of heat transfer.
13. How is heat mainly transferred in the troposphere?
14. What causes wind?
15. What are the two types of local winds?
16. Be able to draw both kinds of local winds
 - a. Landbreeze
 - b. Seabreeze
17. What is a monsoon?
18. What kind of weather pattern is caused by the summer monsoon?
19. What kind of weather pattern is caused by the winter monsoon?
20. What are global winds?
21. Give an example of a global wind.
22. What is evaporation?
23. What is condensation?
24. What is a condensation nuclei?
25. How do clouds form?
26. What is humidity?
27. What is relative humidity?
28. What tool measures humidity?
29. What are the three types of clouds?
30. What do the three types of clouds look like?
31. What is precipitation?
32. What are the 5 types of precipitation?
33. Explain how each type of precipitation forms from the cloud to the ground.
34. What is a drought?
35. Can we control the weather? What is this method called?

