

CLOUDS

Go to <http://formontana.net> and then click on picture # 10.

1. What type of cloud is shown in the photos at the top and bottom of this page?
2. What do the mammary glands of mammal mothers produce?
3. What is the scientific name for thunderclouds?
4. Some thunderclouds have very distinct flat, anvil-shaped tops. Explain why.
5. What type of motion in the atmosphere is **usually** responsible for the formation of clouds?
6. Which of the following would help clouds form?
 - a. Air flows down the eastern slope of the Rockies near Browning.
 - b. Air on a barren mountain slope gets hot and begins to rise.
7. Many people think that clouds are made up of water vapor. **THAT IS NOT CORRECT.** What are the two possible things clouds are made of?
8. As air rises, it expands. This expansion causes the air to get colder. If it gets cold enough, invisible vapor starts to condense on particles. These droplets (or ice crystals) are what clouds are made of. **Click on the link titled, "Watch the Recipe for a Cloud Video."** (You can watch without the sound.) Does the cloud form when Mr. Benson squeezes the bottle (compression), or when he releases it?
9. Does the air in the bottle get colder when Mr. Benson squeezes the bottle, or when he releases it?
10. Which is more like what happens to air as it rises? . . . squeezing the bottle, or releasing it?
11. What happens to the cloud when Mr. Benson puts pressure on the air inside? Circle one:
 - a. The cloud forms because water is changing from vapor into tiny droplets.
 - b. The cloud evaporates because the compression heats the air inside.

12. What is the purpose of adding some smoke particles to the bottle? Hint: Go back and read question #8.

CHINOOK WINDS

Go back to <http://formontana.net> and then click on picture # 61.

13. The area outlined in yellow on this map is what Montanans call the ‘Rocky Mountain Front’ (a.k.a. The Front). It is also an area where Chinook Winds are common. What is a Chinook Wind?

14. Explain why moist air contains lots of “energy”. (How did the energy get into the air?)

15. What must happen in order for this energy to be released into the air as heat?

16. **Click on the link to watch the short video about latent heat.** You may watch it silently if necessary. How cold does the water inside the little plastic (Tic Tac) container get? (NOTE: The normal freezing point for water is 0 Celsius . . . or 32 Fahrenheit.)

17. This “super-cooled water” needs something to help it start freezing. What is dropped into the container to trigger the freezing?

18. When it freezes, it does so fairly quickly. Why does the temperature rise as it freezes? The same thing happens as water vapor changes to ice crystals to form snowflakes.

19. **Go back to the web site (www.formontana.net #61).** Clouds often form as air is forced up the slope of a mountain. During cloud formation water vapor changes to cloud crystals (tiny pieces of ice). If these crystals grow too large they begin to fall as snow. When water molecules change from vapor to solid (fast to slow), will they absorb heat energy, or give off heat energy?

20. Will the phase change described in #19 make the air surrounding air warmer, or cooler?
21. Look at the diagrams on the bottom of the web page. What is it about the flow of air on the west slopes of the mountains that helps clouds form? Circle one.
- a. Air is rising on the west slopes. b. Air is sinking on the west slopes.
22. Explain why there no Chinook effect in the top diagram.
23. Click on the Hot Link titled “More about the Chinook Effect”. What is the color of the part of Montana that was experiencing Chinook winds on this day (Dec. 19, 2003)?
24. Look at the map at the bottom of the web page, which shows the shape of the land. What stands out when you compare western USA to the rest of the country?
25. **Click on the Hot Link titled “This energy demo . . . “.** Read the explanation. When sweat (mostly water) evaporates from your skin, do those water molecules absorb heat from your skin, or give off heat to your skin as they change from liquid to vapor?
26. Why does the thermometer that is wetted with alcohol get colder than the one wetted with water?
27. Why does the one wetted with water get colder than the dry one?