

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

NATS 101 Introduction to Weather and Climate, Section 54, Fall 2005  
Quiz #2: Thursday, 13 October 2005.

The Water Cycle [10]

- c 1. Arizona gets 40% of its water from [5]
- a. effluent.
  - b. surface water (runoff, rivers, etc.).
  - c. Colorado River.
  - d. All of the above.
- a 2. An aquifer is [5]
- a. saturated soil and rock below the water table.
  - b. an underground river.
  - c. surface water from rainfall.
  - d. None of the above.

Humidity [30]

- a 3. As the air temperature increases, the air's capacity for water vapor [5]
- a. increases.
  - b. decreases.
  - c. remains the same.
  - d. is unrelated to air temperature and can either increase or decrease.
- a 4. At what time of day is the relative humidity at a *minimum*? [5]
- a. when the air temperature is highest.
  - b. just before sunrise.
  - c. about midnight.
  - d. when the air temperature is lowest.

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**Questions 5-8 refer to the temperature and dew point data for the following cities**

City	Air Temperature (°F)	Dew Point (°F)
City A	95	76
City B	10	10
City C	30	21
City D	50	42

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- a   5. Which city has the *highest* saturation vapor pressure? [5]  
a. City A.  
b. City B.  
c. City C.  
d. City D.
- a   6. Which city has the *greatest* amount of water vapor in the air? [5]  
a. City A.  
b. City B.  
c. City C.  
d. City D.
- b   7. Which city has the *least* amount of water vapor in the air? [5]  
a. City A.  
b. City B.  
c. City C.  
d. City D.
- b   8. Which city has the *highest* relative humidity? [5]  
a. City A.  
b. City B.  
c. City C.  
d. City D.
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### Clouds [20]

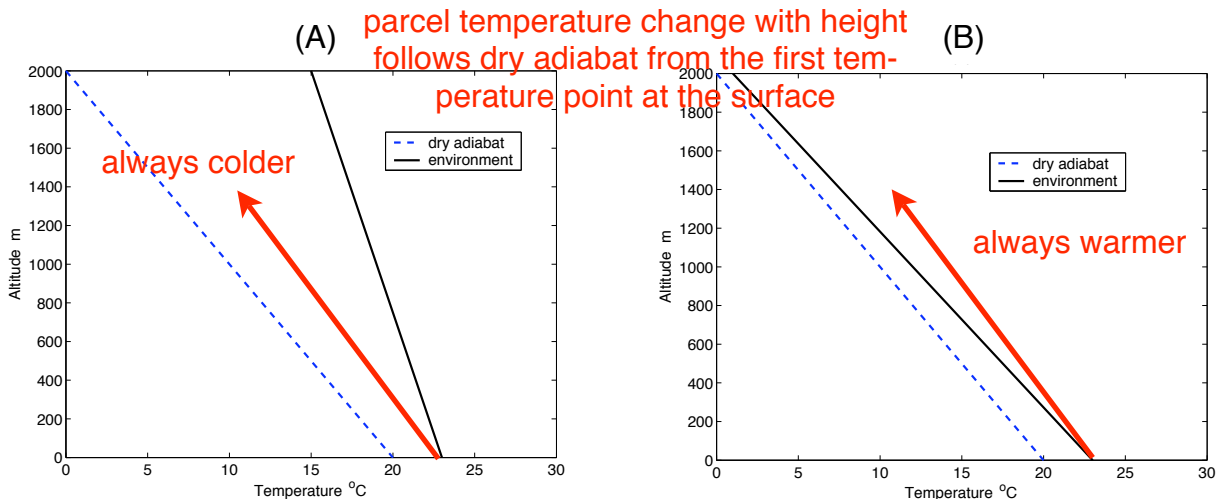
- a   9. Particles that serve as surfaces on which water vapor may condense are called [5]  
a. condensation nuclei.  
b. scud.  
c. hydrophobic nuclei.  
d. nacreous nuclei.
- b   10. In a polluted sky, clouds that form are [5]  
a. are made of fewer, larger droplets than clouds that form in clean air.  
b. more reflective than clouds that form in clean air.  
c. thinner than clouds that form in clean air.  
d. the same as clouds that form in clean air.
- b   11. Which association below is *not* correct? [5]  
a. altostratus - middle cloud.  
b. stratocumulus - cloud of vertical development.  
c. cirrus - high cloud.  
d. cumulonimbus - cloud of vertical development.

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- d 12. Frost forms when [5]
- the dew point is at or below 32°F.
  - objects on the ground cool below the dew point.
  - water vapor changes into ice without first becoming a liquid.
  - all of the above.

**Stability [20+5]**

- b 13. The dry adiabatic lapse rate is the rate at which [5]
- an air parcel rises.
  - temperature changes in a rising or descending parcel of unsaturated air.
  - volume changes when a parcel expands or is compressed.
  - latent heat energy is released in a rising air parcel.

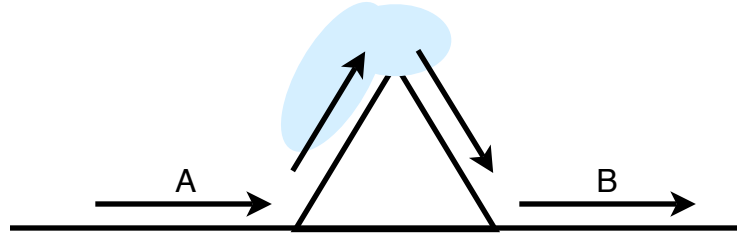


Assuming no condensation occurs in the rising parcel for either case, use the profiles above to answer the following question.

- b 14. Which of the above environments is unstable. [5]
- Environment profile A.
  - Environment profile B.

- d 15. Stratiform clouds form in a **STABLE** **UNSTABLE** atmosphere and grow mainly in a **HORIZONTAL** **VERTICAL** direction. (choose one word from each pair). [5]
- UNSTABLE**, **HORIZONTAL**.
  - UNSTABLE**, **VERTICAL**.
  - STABLE**, **VERTICAL**.
  - STABLE**, **HORIZONTAL**.

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a  16. The air at point A in the figure above will be WARMER COLDER than at B and will have a HIGHER LOWER dew point. (choose one word from each pair) [5]

- a. COLDER, HIGHER.
- b. COLDER, LOWER.
- c. WARMER, HIGHER.
- d. WARMER, LOWER.

E.C. Is the troposphere, with an average lapse rate of  $6.5^{\circ}\text{C}/\text{km}$ , stable or unstable. Why? [5]

The troposphere is stable because the temperature decreases more slowly than the dry adiabatic lapse rate of  $10^{\circ}\text{C}/\text{km}$ . Air parcels that are lifted upward will therefore always be colder than their environment.

### Precipitation Formation [15+5]

b  17. Would you expect the largest raindrops to form in a cloud with STRONG or WEAK updrafts? [5]

- a. WEAK.
- b. STRONG.

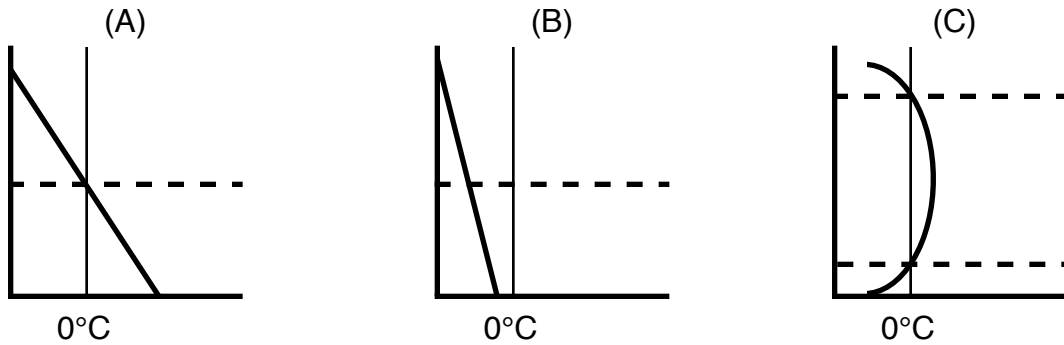
b  18. Supercooled water is found in the [5]

- a. warm part of clouds.
- b. mixed ice and water part of clouds.
- c. ice only part of clouds.
- d. all of the above.

c  19. The growth of a precipitation particle by the collision of an ice crystal (or snowflake) with other ice crystals is called, [5]

- a. coalescence.
- b. spontaneous nucleation.
- c. aggregation.
- d. deposition.

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b E.C. Referring to the above figure, which of the following environment profiles (heavy black curves) indicates precipitation reaching the ground as snow? [5]

- a. Profile A.
- b. Profile B.
- c. Profile C.

#### Air Pressure [5]

c 20. The surface pressures at the bases of warm and cold columns of air are equal. Air pressure in the warm column of air will \_\_\_\_\_ with increasing height \_\_\_\_\_ than in the cold column.

- a. increase, more rapidly.
- b. decrease, more rapidly.
- c. decrease, more slowly.
- d. increase, more slowly.