

Name: _____

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

The Water Cycle [10]

- b 1. _____ occupy or cover approximately 70% of the earth's surface? [5]
- Forests.
 - Ocean.
 - Clouds.
 - Cities.
- c 2. Arizona gets 40% of its water from [5]
- effluent.
 - surface water (runoff, rivers, etc.).
 - Colorado River.
 - All of the above.

Humidity [30]

- b 3. Which of the following is *not* affected by changing an air parcel's temperature? [5]
- the parcel's relative humidity.
 - the parcel's mixing ratio.
 - the parcel's vapor pressure.
 - the parcel's saturation vapor pressure.
- d 4. Which of the following is the *best* indicator of the amount of water vapor in the air? [5]
- air temperature.
 - saturation vapor pressure.
 - relative humidity.
 - dew point.

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 | 30 | 21 |
| City C | 10 | 10 |
| City D | 50 | 42 |

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- c 5. Which city has the highest relative humidity? [5]
a. City A.
b. City B.
c. City C.
d. City D.
- c 6. 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.
- a 7. 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.
- a 8. Which city has the *highest* saturation vapor pressure? [5]
a. City A.
b. City B.
c. City C.
d. City D.
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Clouds [20]

- c 9. Particles that serve as surfaces on which water vapor may condense are called [5]
a. hydrophobic nuclei.
b. nacreous nuclei.
c. condensation nuclei.
d. scud.
- b 10. In a polluted sky, clouds that form are [5]
a. thinner than clouds that form in clean air.
b. more reflective than clouds that form in clean air.
c. are made of fewer, larger droplets than clouds that form in clean air.
d. the same as clouds that form in clean air.
- d 11. Frost forms when [5]
a. the dew point is at or below 32°F.
b. objects on the ground cool below the dew point.
c. water vapor changes into ice without first becoming a liquid.
d. all of the above.

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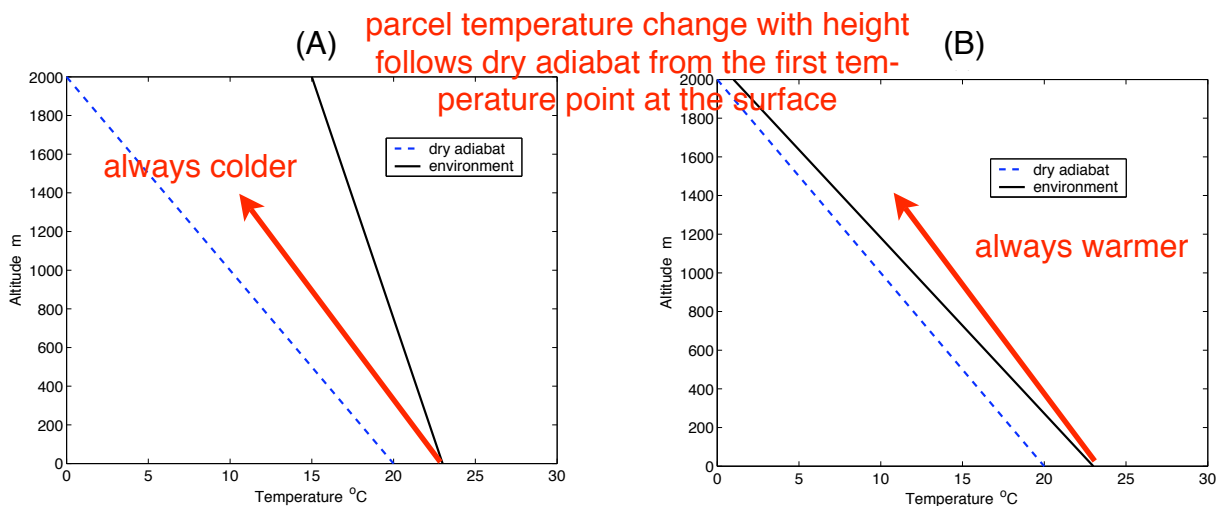
a 12. Which association below is *not* correct? [5]

- a. cirrocumulus - layer cloud.
- b. cumulonimbus - thunderstorm.
- c. stratocumulus - low cloud.
- d. cirrostratus - ice cloud.

Stability [20+5]

d 13. The difference between the “moist” and “dry” adiabatic lapse rates is due to the fact that [5]

- a. saturated air is always unstable.
- b. an unsaturated air parcel expands more rapidly than a saturated parcel.
- c. moist air weighs less than dry air.
- d. latent heat is released by a rising parcel of saturated air.



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

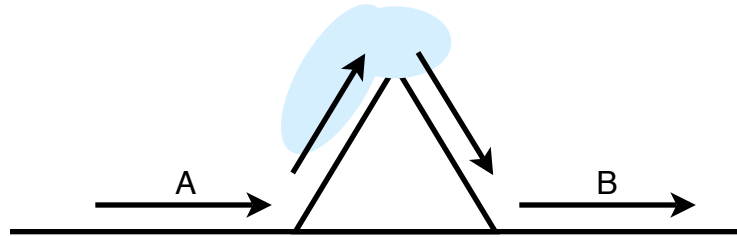
a 14. Which of the above environments (black lines) is stable? [5]

- a. Environment profile A.
- b. Environment profile B.

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

- a. STABLE, HORIZONTAL.
- b. STABLE, VERTICAL.
- c. UNSTABLE, VERTICAL.
- d. UNSTABLE, HORIZONTAL.

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

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

- a. STRONG.
- b. WEAK.

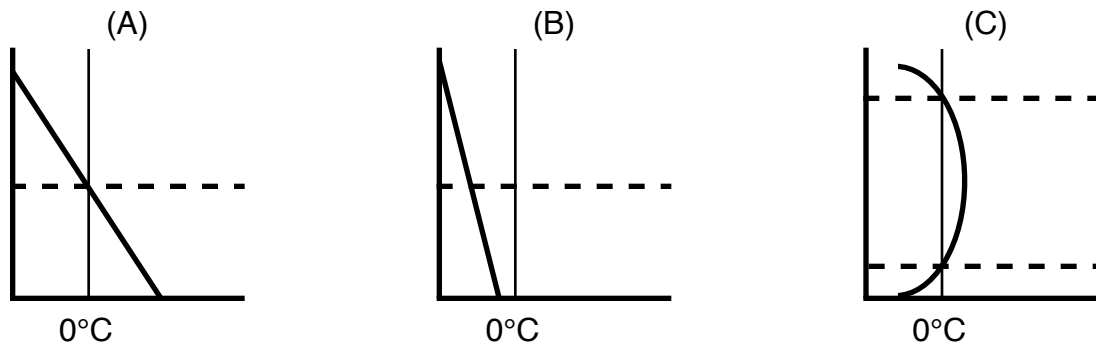
 a 18. Collision/Coalescence occurs in the [5]

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

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

- a. accretion.
- b. spontaneous nucleation.
- c. Bergeron process.
- d. deposition.

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

- Profile A.
- Profile B.
- Profile C.

Air Pressure [5]

d 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.

- decrease, more rapidly.
- increase, more rapidly.
- increase, more slowly.
- decrease, more slowly.