

Chapter 4 Review Questions

MULTIPLE CHOICE: Choose the one alternative that best completes the statement or answers the question.

1. A large temperature lapse rate would occur in a layer with:
 - A) uniformly cold temperatures throughout.
 - B) cold air above, warm air below.
 - C) warm air above, cold air below.
 - D) uniformly warm temperatures throughout.
2. About what percent of Earth's water can be found in the oceans?
 - A) 97 percent
 - B) 90 percent
 - C) 70 percent
 - D) 53 percent
3. Why does a rising air parcel cool off?
 - A) Its relative humidity is less than 100 percent.
 - B) It loses heat to its surroundings.
 - C) It loses energy by radiation.
 - D) It expands.
 - E) It is unstable.
4. Which of the following processes requires the highest release of energy from the water molecules?
 - A) melting
 - B) freezing
 - C) condensation
 - D) deposition
5. When the dry and wet bulb temperatures measured by a psychrometer are equal, all but one of the following is true. Which one is false?
 - A) A rise in temperature would cause condensation.
 - B) The air is saturated.
 - C) Water vapor content is a maximum.
 - D) Relative humidity is 100 percent.
 - E) Dew point is equal to the dry bulb.
6. The amount of water vapor in the air (by volume) usually does not exceed:
 - A) 4 percent
 - B) 14 percent
 - C) 100 percent
 - D) 28 percent
 - E) 40 percent

7. If air at sea level with a temperature of 27 degrees C is forced up a mountain slope and the air's dew point at the condensation level is 14 degrees C, at what elevation will condensation begin?

- A) 2700 meters
- B) 1300 meters
- C) 1400 meters
- D) 2600 meters

8. The moist adiabatic rate is different from the dry adiabatic rate because:

- A) an unstable air parcel expands more rapidly.
- B) latent heat is released inside a parcel of rising saturated air.
- C) saturated air is always unstable.
- D) a parcel of saturated air weighs less than a parcel of unsaturated air.
- E) unsaturated air is always stable.

9. If your environmental lapse rate is -7 C/km on a partly cloudy afternoon, then the atmosphere is said to be:

- A) absolutely stable.
- B) absolutely unstable.
- C) conditionally stable.

10. If your environmental lapse rate is 17 C/km on a partly cloudy afternoon, then the atmosphere is said to be:

- A) absolutely unstable.
- B) absolutely stable.
- C) conditionally stable.

11. An inversion represents an extremely stable atmosphere because a parcel of air that rises into an inversion will eventually become _____ and _____ dense than the air surrounding it.

- A) colder, less
- B) colder, more
- C) warmer, less
- D) warmer, more

12. These two conditions, working together, will make the atmosphere the most unstable.

- A) warm the surface and warm the air aloft
- B) warm the surface and cool the air aloft
- C) cool the surface and warm the air aloft
- D) cool the surface and cool the air aloft

13. The atmosphere is most unstable when the temperature of the air _____ with height.

- A) is uniform
- B) drops rapidly
- C) increases slightly

- D) decreases slightly
 - E) increases rapidly
14. Adiabatic processes are only important for air:
- A) masses which remain near the Earth's surface.
 - B) that is saturated.
 - C) that is polluted.
 - D) that is stagnant.
 - E) which is rising or sinking.
15. During the process of adiabatic cooling, the temperature decreases because the air has:
- A) been compressed.
 - B) lost heat to the colder air at higher altitudes.
 - C) lost some of its water vapor.
 - D) expanded to a larger volume.
 - E) emitted infrared radiation.
16. The property which primarily controls how much water can be present as a gas is:
- A) a number of particulates present.
 - B) availability of latent heat.
 - C) temperature of the air.
 - D) water's specific heat.
 - E) amount of dry air gases present.
17. Assume that the actual vapor content of the air remains constant over the course of the day. How does the relative humidity at 2:00 p.m. probably compare to the relative humidity at 5:00 a.m.?
- A) The relative humidity at 2:00 p.m. is higher.
 - B) The relative humidity at 2:00 p.m. is lower.
 - C) The relative humidity is the same at 2:00 p.m. as at 5:00 a.m.
18. Which of the following requires the GREATEST RELEASE of latent heat energy into the atmosphere?
- A) melting of 1 gram of water
 - B) freezing of 1 gram of water
 - C) evaporation of 1 gram of water
 - D) condensation of 1 gram of water
19. The air in Great Falls, Montana has a temperature of 5°C and a relative humidity of 50 percent. On the same afternoon, the air in Palm Springs, California has a temperature of 25°C and a relative humidity of 50 percent. What can be said about the amount of vapor in the air at these two cities?
- A) Palm Springs will have a higher vapor content than Great Falls.
 - B) Great Falls will have a higher vapor content than Palm Springs
 - C) Great Falls and Palm Springs will have the same vapor content.

20. Water vapor constitutes about this much of the atmosphere by volume.

- A) 0-4 percent
- B) 0-12 percent
- C) 0-100 percent
- D) 4-25 percent
- E) 4-12 percent