Name:_____Date:_____

Geography 120: Earth Systems II. Atmosphere
EXAM 2 (v4). Humidity, condensation, and clouds and cloud development and precipitation.
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Multiple Choice. Select the best answer and mark the appropriate letter on the computer sheet. Each question counts two points for a maximum of 100 points. Should you change your mind, please erase well.

1. When fog "burns off" it
   a. absorbs sunlight and warms up.
   b. evaporates.
   c. thickens from the ground up.
   d. settles to the ground in the form of rain.

2. When you see your breath on a cold morning the air temperature:
   a. must be above freezing.
   b. must be below freezing.
   c. can be above or below freezing.
   d. must be equal to the relative humidity.

3. Steam fog is actually a form of
   a. advection fog.
   b. radiation fog.
   c. evaporation (mixing) fog.
   d. upslope fog.
   e. frontal fog.

4. Which fog does not necessarily form in air that is cooling?
   a. advection fog.
   b. radiation fog.
   c. evaporation (mixing) fog.
   d. upslope fog.

5. When fog lifts above the ground it normally forms this gray sheetlike cloud.
   a. stratus.
   b. altostratus.
   c. nimbostratus.
   d. cirrostratus.
   e. cumulonimbus

6. The term cumulo tells you something about cloud
   a. altitude.
   b. composition.
   c. temperature.
   d. appearance.

7. At which city might you be able to observe cirrus clouds at an altitude of 3,000 m (10,000 feet) above the surface?
   a. Barrow, Alaska.
   b. Honolulu, Hawaii.
   c. Miami, Florida.
   d. Chicago, Illinois.

8. Which association below is <u>not</u> correct?
   a. cirrocumulus - layer cloud.
   b. cumulonimbus - thunderstorm.
   c. stratocumulus - low cloud.
   d. cirrostratus - ice cloud.

9. A “mackerel sky” describes what type of cloud?
   a. cirrocumulus.
   b. stratocumulus.
   c. cumulonimbus.
   d. nimbostratus.
   e. cumulus.

10. Hail is usually associated with what cloud?
   a. stratus.
   b. cumulus.
   c. stratocumulus.
   d. altocumulus.
   e. cumulonimbus.

11. A halo around the moon means that
   a. cirrostratus clouds are present.
   b. the clouds overhead are low clouds.
   c. rain is falling from the clouds overhead.
   d. the clouds are composed of water droplets.

12. Which cloud forms in descending air?

a. cumulus.
b. cumulonimbus.
c. mammatus.
d. pileus.

13. The density of water vapor in a given parcel of air is expressed by the
a. absolute humidity.
b. relative humidity.
c. mixing ratio.
d. specific humidity.
e. saturation vapor pressure.

14. Evaporative coolers are primarily used in climates where the summers are
a. hot and humid.
b. hot and dry.
c. cold and humid.
d. cold and dry.

15. The Gulf Coast states are more humid in summer than the coastal areas of Southern California mainly because of the
a. higher air temperature in the Gulf States.
b. lower air temperature in Southern California.
c. higher water temperature in the Gulf of Mexico.
d. low relative humidity of the air over the Pacific.
e. high dew-point temperature in Southern California.

16. The percentage of water vapor present in the air compared to that required for saturation is the
a. mixing ratio.
b. absolute humidity.
c. dew point.
d. relative humidity.
e. specific humidity.

17. The ratio of the mass of water vapor in a given volume (parcel) of air to the mass of the remaining dry air describes the
a. absolute humidify.
b. mixing ratio.
c. relative humidity.
d. dew point.

18. The temperature to which air must be cooled in order to become saturated is the

a. minimum temperature.
b. dew point temperature.
c. wet-bulb temperature.
d. freezing point.

19. Which of the following is the best indicator of the actual amount of water vapor in the air?
a. air temperature
b. saturation vapor pressure
c. relative humidity
d. dew point temperature

20. This instrument uses wet-bulb and dry-bulb temperature to obtain relative humidity:
a. infrared hygrometer.
b. sling psychrometer.
c. hair hygrometer.
d. electrical hygrometer.

21. The name given to a liquid drop of dew that freezes when the air temperature drops below freezing is
a. frost.
b. black frost.
c. hoarfrost.
d. white frost.
e. frozen dew.

22. Frost forms when
a. objects on the ground cool below the dew point temperature.
b. the dew point is 32° F or below.
c. water vapor changes into ice without first becoming a liquid.
d. all of the above.

23. Which of the following statements is(are) correct?
a. the largest concentration of condensation nuclei are usually observed near the earth's surface.
b. wet haze restricts visibility more than dry haze
c. fog is actually a cloud resting on the ground
d. with the same water vapor content, fog that forms in dirty air is usually thicker than fog that forms in clear air
e. all of the above are correct

24. Which of the following identifications is not correct?
    a. hydrophobic - water producing
    b. radiation fog - ground fog
    c. steam devils - advection fog
    d. hygroscopic - water-seeking nuclei
    e. steam fog - arctic sea smoke

25. Wet haze forms when the relative humidity is
    a. equal to 100%.
    b. above 100%.
    c. less than 100%.
    d. equal to the dew point temperature.

26. Radiation fog forms when
    a. air pressure at the ground drops suddenly.
    b. air next to the ground is cooled.
    c. water vapor is added to air next to the ground.
    d. there is an increase in condensation nuclei in air at the ground.

27. The rate at which the actual air temperature changes with increasing height above the surface is referred to as the
    a. environmental lapse rate.
    b. dry adiabatic rate.
    c. moist adiabatic rate.
    d. thermocline.

28. A rising parcel of air that does not exchange heat with its surroundings is referred to as
    a. isothermal ascent.
    b. an adiabatic process.
    c. forced lifting.
    d. advection.

29. Which of the following environmental lapse rates would represent the most unstable conditions in a layer of unsaturated air?
    a. 1°C per 1,000 m
    b. 3°C per 1,000 m
    c. 6°C per 1,000 m
    d. 9°C per 1,000 m
    e. 11°C per 1,000 m

30. The most latent heat would be released in a ____ parcel of ___ saturated air.
    a. rising, warm
    b. rising, cold
    c. sinking, warm
    d. sinking, cold

31. The difference between the "moist" and "dry" adiabatic rates is due to the fact that
    a. saturated air is always unstable.
    b. an unsaturated air parcel expands more rapidly than a saturated air parcel.
    c. moist air weighs less than dry air.
    d. latent heat is released by a rising parcel of saturated air.

32. Which condition below would make a layer of air more unstable?
    a. an increase in wind speed
    b. lifting the entire air layer
    c. cooling the upper part of the layer
    d. all of the above

33. A conditionally unstable atmosphere is ___ with respect to unsaturated air and ____ with respect to saturated air.
    a. unstable, stable
    b. unstable, unstable
    c. stable, unstable
    d. stable, stable

34. Which of the sets of conditions, working together, will make the atmosphere the most <u>unstable</u>?
    a. cool the surface and warm the air aloft
    b. cool the surface and cool the air aloft
    c. warm the surface and cool the air aloft
    d. warm the surface and warm the air aloft

35. Just above cumulus humilis clouds you would expect to find
    a. a stable layer.
    b. an unstable layer.
    c. a conditionally unstable layer.
    d. unusually strong horizontal winds

36. Subsidence inversions are best developed with ____ pressure areas because of the ___ air motions associated with them.
    a. high, rising
    b. high, sinking
    c. low, rising

d. low, sinking

37. An inversion represents an extremely stable atmosphere because air that rises into the inversion will eventually become ____ and ____ dense than the surrounding air.
a. warmer, less
b. warmer, more
c. colder, less
d. colder, more

38. Most rain at middle latitudes is produced by the ice crystal process. This is because
a. ice crystal nuclei are more plentiful than condensation nuclei.
b. most clouds form in cold regions of the atmosphere.
c. ice crystals evaporate more slowly than water droplets.
d. most rain occurs during the winter.

39. Which cloud type below will only produce precipitation by the collision-coalescence process?
a. a thick, cold nimbostratus cloud
b. a thick, warm cumulus cloud
c. a thick, cold cumulus cloud
d. a thick, supercooled cumulonimbus cloud with abundant nuclei
e. a supercooled cumulus congestus cloud

40. The largest snowflakes would probably be observed in ____ air whose temperature is __ _ freezing.
a. moist, near
b. dry, near
c. moist, well below
d. dry, well below

41. An aggregate of ice crystals is
a. a snowflake.
b. freezing rain.
c. sleet.
d. glaze.
e. hail.

42. If a city were to receive _ inch of rain in the morning and then 5 inches of snow that afternoon, about how much precipitation would the weather service report for that day?
a. 5 _ inches
b. _ inch
c. 1 inch
d. 10 inches

43. What is the temperature outside an aircraft flying at 30,000 feet from the ground, given that the surface temperature is 80°F? (lapse rate=3.5°F/1000 feet).
    a. -23 °F.
    b. -32°F.
    c. -51°F.
    d. -25°F.

44. Given that a temperature reading is 30°C, what is the equivalent temperature in °F?
    a. 62°F.
    b. 86°F.
    c. 68°F.
    d. 76°F.

45. Select the odd member from the following list:
    a. isotherm.
    b. isohyet.
    c. isohypse.
    d. isostasy.

46. Assume that each of four cities whose latitudes are listed below are at the same elevation. Which one should have the highest annual mean temperature?
    a. 10°S
    b. 30°N
    c. 50°S
    d. 70°N

47. Assume that each of four cities whose latitudes are listed below have equally continental climates. Which one should have the largest annual temperature range?
    a. 10°S
    b. 30°N
    c. 50°S
    d. 70°N

48. Which of the following should be the warmest month in central Australia?
    a. January.
    b. February.
    c. July.
    d. August.

49. Given that the temperature of a parcel of air is 35°F at 8,000 feet elevation, what is the temperature at 2,000 feet elevation?
    a. 27°F
    b. 56°F
    c. 53°F
    d. 14°F

50. All of the following are controls of temperature except
    a. differential heating of land and water.
    b. ocean currents.
    c. altitude.
    d. longitude.