1. When unsaturated air is lifted
   a. It is compressed and warms
   b. It cools at the DALR
   c. It cools at the SALP
   d. Nothing happens

2. Hurricanes in the North Atlantic typically develop
   a. In the Gulf of Mexico
   b. From mid latitude cyclones
   c. Off the coast of West Africa
   d. Around the Caribbean Islands

3. Hurricanes get their energy from
   a. Net Radiation
   b. Latent heat
   c. Wind energy
   d. Sensible heat

4. The path of a hurricane in the North Atlantic is influenced by
   a. Upper level winds of the Hadley cell
   b. The Westerlies
   c. The Easterlies
   d. a and b
   e. a and c

5. The section of the hurricane with the weakest winds is the eye wall
   a. True
   b. False

6. When a hurricane reaches land it weakens because
   a. Friction force is greater
   b. Latent heat energy is less
   c. Wind move more directly into Low pressure center
   d. All of the above
   e. Only a and b

7. Thunder and lightening are the result of
   a. The presence of updrafts in an cloud
   b. The equalization of charges by electrical discharge
   c. The presence of downdraft in a cloud
   d. The release of latent heat energy
   e. A chemical reaction within the cloud

8. The mature stage of a thunderstorm is characterized by
   a. Only very strong updrafts
   b. Only very strong downdrafts
   c. Both updrafts and downdrafts
d. None of the above

9. Gradient Winds
   a. Have net balance in forces
   b. Have acceleration
   c. Flow along curved isobars
   d. All of the above
   e. None of the above

10. Uplift due to overrunning is associated with
    a. A cold front
    b. A warm front
    c. A stationary front
    d. An occluded front

11. Frontal Wedging is associated with
    a. A cold front
    b. A warm front
    c. A stationary front
    d. An occluded front
    e. None of the above

12. The initial stages of the formation of a mid latitude cyclone is associated with
    a. A cold front
    b. A warm front
    c. A stationary front
    d. An occluded front
    e. None of the above

13. A location by a large water body is likely to receive
    a. Lake breeze during the night
    b. Land breeze during the daytime
    c. Lake breeze during the daytime
    d. Lake breeze during both day and night

14. Valley Breeze are most common
    a. In the Winter
    b. In the Summer
    c. In the Fall
    d. In the Spring

15. The hardening of a tightly closed pop bottle as you drive up a mountain is a result of
    a. The carbonation of the pop
    b. The decrease in temperature
    c. The decrease in air pressure
    d. The increase in air pressure

16. As a Hurricane moves over land
    a. Friction force increases
    b. Pressure gradient force dominates
    c. Wind speed decreases
    d. All of the above
    e. Only a and c

17. Which of the following statement is not correct
    a. $K$ does not control surface temperature
    b. Calm, cloudy nights are usually warmer than calm clear nights
    c. Air temperature normally peaks after solar radiation
    d. Minimum temperature occurs around sunrise
18. During the Summer, area along the West Coast of the US should be _____________ than a continental area at the same latitude
   a. cooler
   b. warmer
   c. There shouldn’t be a temperature difference between the two locations
   d. Any such temperature difference would only exist during the winter

19. Unstable air has a tendency to
   a. sink
   b. rise
   c. resist upward movement
   d. move horizontally

20. The air can become saturated by
   a. adding water vapor
   b. raising the temperature to dew point
   c. lowering the temperature to the dew point
   d. a and b
   e. a and c

21. Cloud formation requires
   a. Saturated air
   b. CCN
   c. Stable conditions
   d. All of the above
   e. a and b

22. Which of the following statement is incorrectly linked
   a. Bergeron → cold cloud, FN, mid latitude
   b. Collision coalescence → warm cloud, tropics, FN
   c. Bergeron → tropics, warm cloud, hydrosopic particles
   d. b and c
   e. a and b

23. Cumulonimbus clouds
   a. Produce thunderstorms
   b. Are layered clouds
   c. Are fair weather clouds
   d. Are thin wispy ice clouds

24. Winds are a result of
   a. Vertical pressure differences
   b. Horizontal pressure differences
   c. vertical differences in temperature
   d. stability conditions

25. The height at which a given pressure level occurs is represented as
   a. isobars
   b. isotherms
   c. contours of geopotential
   d. pressure gradient

26. Which of the following is not a way to produce clouds?
   a. Lifting along a front
   b. Subsidence
   c. Convergence of surface air
   d. Warming the surface of the earth

27. The force in the atmosphere which is predominantly responsible for the magnitude of the wind is
a. Pressure gradient force  
b. Coriolis force  
c. Friction force  
d. Potential Energy

28. Radiation fog  
a. Occurs most often on cloudless nights with shallow moist layer  
b. Most common in summer  
c. Most common in late fall and winter  
d. a and b  
e. a and c

29. The Coriolis force  
a. Affect both the wind direction and wind speed  
b. Acts at right angles to the direction of air flow  
c. Depends on latitude and velocity  
d. Affects only the magnitude of the wind  
e. b and c

30. High clouds  
a. Are composed of ice crystals  
b. Are responsible for most of the snow in Indiana  
c. Include altostratus clouds  
d. Have a fairly large water content

31. Cyclones are  
a. Enclosed areas of high pressure  
b. Enclosed areas of low pressure  
c. Elongated zones of high pressure  
d. Areas of divergence

32. Chinook and Foehn winds are  
a. Pulled across and down the lee side of mountains by low pressure systems  
b. Sinking cool air drainage from rapidly cooling slopes  
c. Upslope air flow resulting from intense mountain top heating  
d. Types of land-sea breeze

33. The 500 mb pressure surface show a decrease in height at the pole, which is due primarily to  
a. Low temperatures at the pole  
b. Lower density at the pole  
c. The absence of the Coriolis effect at the pole  
d. The presence of friction

34. The effect of friction  
a. Increases wind speed  
b. Increases with height  
c. Increases the Coriolis force  
d. Cause winds to cross isobars at an angle

35. In the northern hemisphere, the resulting wind direction aloft for this diagram is:  
   a. Perpendicular to the isobars from the S  
   b. Perpendicular to the isobars from the N  
   c. Parallel to the isobars from the E  
   d. Parallel to the isobars from the W

36. Hurricanes do not form between 0-5 degrees latitude because  
a. It is too warm in that region
b. Coriolis force is too weak
c. Coriolis force is too strong
d. The westerlies are there

37. The formation of a hurricane requires
   a. A pre-existing disturbance with thunderstorms
   b. Strong upper level winds
   c. Ocean temperatures > than 80 degrees to 150 ft. depth
   d. All of the above
   e. a and c

38. Convection occurs
   a. Only in solids
   b. Only in water
   c. Only in the atmosphere
   d. Only in fluids

39. Which of the following is a conservative measure of humidity?
   a. Specific humidity
   b. Relative humidity
   c. Vapor pressure
   d. All of the above

40. Our day-night cycle is a result of
   a. The earth’s rotation
   b. The tilt of the earth
   c. The perihelion
   d. The solar altitude

41. A cold front is associated with
   a. Cumulus type cloud and sudden intense precipitation
   b. A cold air mass in front
   c. Small pressure gradient
   d. Slow rate of advance

42. A warm front is associated with:
   a. Cirrus to stratiform clouds with persistent light to moderate precipitation over several days
   b. Cumulus type clouds and sudden intense precipitation
   c. The presence of contrails on a clear day
   d. a and c
   e. b and c

43. A mountain breeze is usually strongest and best developed
   a. In summer, during the daytime
   b. In summer, during the nighttime
   c. In winter, during the daytime
   d. In winter, during the nighttime

44. An air mass is
   a. A body of air with very sharp pressure gradients
   b. A body of air with similar temperature and moisture conditions
   c. A zone of low pressure
   d. A zone of high pressure

45. What type of air mass would be expected form the North Pacific source region?
   a. Moist and warm
   b. Moist and cool
   c. Dry and cold
d. None of the above

46. An air mass from the North Pacific is designated:
   a. cP
   b. mP
   c. cT
   d. mT

47. Which type of front has the warm air cut off from the surface
   a. Warm front
   b. Cold front
   c. Stationary front
   d. Occluded front

48. Air mass source regions are associated with
   a. Very weak winds
   b. Only large land areas
   c. Anticyclones
   d. a and b
   e. a and c

49. Mid-latitude cyclones are
   a. Warm fronts
   b. Cold fronts
   c. Closed zones of high-pressure
   d. Closed zones of low pressure

50. Wave cyclones
   a. Develop along a polar front
   b. Has a cold and warm front
   c. Start with a wavelike kink
   d. Moves east or northeast
   e. All of the above

51. Warm fronts:
   a. Often overtake cold fronts
   b. Are the most common source of violent storms
   c. Moves slower than cold fronts
   d. Has the steepest pressure gradient

52. During the dissipation stage of a thunderstorm
   a. Downdraft dominates
   b. Updraft dominates
   c. Downdraft coexist with updraft
   d. A cool draft is felt ahead of the rain
   e. c and d

53. Cirrus clouds and aircraft contrails are signs of
   a. Approaching cold front
   b. Approaching warm front
   c. An impending mid latitude cyclone
   d. None of the above

54. The hook is:
   a. A feature of a supercell
   b. A characteristic wind pattern and shape used in tornado detection
   c. Occur as a result of the vault area of a thunderstorm cloud
   d. All of the above
55. cP and mT are most likely to meet and generate tornadoes in
   a. Western US
   b. Western Europe
   c. Central US
   d. East Asia

56. A suction vortex of a tornado
   a. Is a zone of intense rotation causing variable and selective damage by the tornado
   b. Moves along the center of the tornado path
   c. Only occur in one part of the tornado
   d. Only occurs in very weak tornadoes

57. Hurricanes and tornadoes are severe forms of
   a. Anticyclones
   b. Cyclones
   c. a and b
   d. none of the above

58. The jet stream is
   a. Typically found above areas of large horizontal temperature gradient
   b. Typically found in regions of steep pressure gradient
   c. A narrow band of high wind speeds at the top of the troposphere
   d. Most powerful along the polar front
   e. All of the above

59. The ITCZ is found at the
   a. North pole
   b. South pole
   c. Equator
   d. Mid latitudes

60. The synoptic wind circulation at the equator is called the
   a. Polar cell
   b. Hadley cell
   c. Farrel cell
   d. ITCZ

61. The single Hadley cell global circulation model is not observed because of
   a. The different types of air masses
   b. The earth’s magnetic field
   c. The earth’s rotation and energy gradient between the equator and poles
   d. The minimal deflection of winds within the ITCZ

62. An air mass is characterized by
   a. It’s pressure gradient
   b. It’s horizontal extent
   c. Its temperature and moisture conditions
   d. It’s duration in the source region

63. If a cP or cA air moves over ocean in the winter time
   a. Moisture at the surface increases
   b. Temperature at the surface decreases
   c. Temperature at the surface increases
   d. a and c
   e. a and b
64. Absorption, reflection and transmission
   a. Are convective processes
   b. Occurs during conduction
   c. Are the fate of radiation when it reaches the atmosphere
   d. Are modes of energy transfer in the earth-atmosphere system

65. Weather is
   a. The manifestation of atmospheric processes
   b. Spatial variation of meteorological processes
   c. A statistical concept
   d. The same as climate

66. As a hurricane’s eye passes directly overhead you would expect to observe:
   a. A rise in temperature
   b. Low wind speeds
   c. Descending air
   d. All of the above
   e. Only b and c

67. Hurricane can spawn tornadoes
   a. True
   b. False

68. The type of fog observed over a heated swimming pool is
   a. Radiation fog
   b. Advection fog
   c. Evaporation fog
   d. None of the above

69. The mid latitude westerlies are a result of
   a. Mid latitude wave cyclone
   b. Hadley cell and the Coriolis effect
   c. Ferrel cell and the Coriolis effect
   d. Katabatic winds

70. Ridge and trough are
   a. Distribution of surface atmosphere pressure variations
   b. Elongated zones of high and low pressure
   c. Elongated zones of intense precipitation
   d. All of the above
   e. None of the above

71. Which is **not** true of greenhouse gasses?
   a. They are a component in climate change
   b. They differ in efficiency of heat absorption
   c. They are all human produced
   d. They can be present in the stratosphere

72. When you breath out on a cold day this type of fog is formed
   a. Radiation fog
   b. Advection fog
   c. Ground fog
   d. Evaporation fog

73. Anticyclones in the southern hemisphere are associated with
   a. High pressure—deflection to the left—divergence
   b. High pressure—deflection to the right—divergence
   c. Low pressure—deflection to the right—divergence
d. Low pressure—deflection to the left—convergence

74. In a warm-type occluded front
   a. Air ahead of the front is colder and drier than air behind the front
   b. Air ahead of the front is warmer and more moist than air behind the front
   c. Occurs when mP invades cP
   d. a and c
   e. a and c

75. An inversion means that
   a. Temperature is decreasing with height
   b. Temperature is increasing with height
   c. Temperature is resistant to vertical change
   d. The layers of the atmosphere are inverted