

Meteorology Pre Test for Final Exam

MULTIPLE CHOICE

1. The most common way for air to be cooled in order that a cloud may form is by
 - a) emitting radiation
 - b) rising and expanding
 - c) sinking and contracting
 - d) reflecting radiation
 - e) evaporating water
2. Why do clouds represent a source of heat for the atmosphere?
 - a) they increase the absorption of solar radiation
 - b) they conduct heat from the earth's surface
 - c) cloud formation releases latent heat to the air
 - d) melting ice crystals in the cloud absorb heat
 - e) evaporation of the droplets absorbs heat
3. The important difference between liquid droplets and ice crystals in a supercooled cloud is that ice crystals
 - a) are more pure
 - b) are smaller
 - c) increase the water vapor content of the cloud
 - d) grow much more rapidly
 - e) are colder
4. The cloud droplets in a cloud are formed by water vapor molecules and
 - a) molecules of air
 - b) other water vapor molecules
 - c) hygroscopic nuclei
 - d) protons
 - e) ions
5. Inside of a cloud, how do the air temperature and the dew point compare to one another?
 - a) they are equal
 - b) air temperature exceeds dew point
 - c) dew point exceeds air temperature
 - d) there is no consistent relationship
6. Hygroscopic nuclei may be formed from
 - a) particles of dust
 - b) nitric acid particles
 - c) smoke from forest fires
 - d) salt crystals from the ocean
 - e) all of the above
7. Clouds and precipitation form in the air primarily due to
 - a) moisture being added to the air
 - b) air being cooled as it rises
 - c) excessive numbers of hygroscopic nuclei
 - d) release of latent heat
 - e) absorption of infrared radiation
8. The process by which a cloud droplet first forms is
 - a) condensation
 - b) evaporation
 - c) precipitation
 - d) collision and coalescence
 - e) supercooling

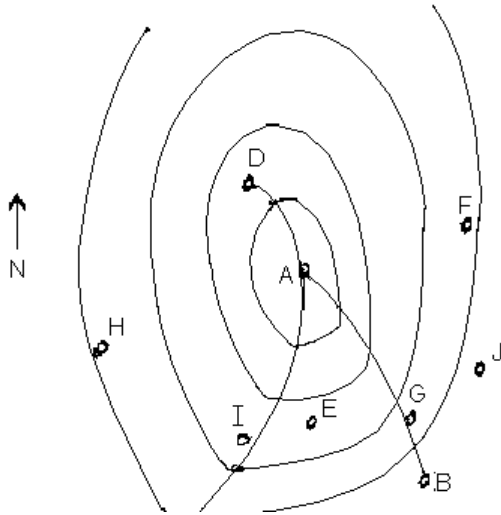
9. Freezing rain (ice storm) or sleet occurs when
- upper air is cold and surface air is warm
 - both surface and upper air are cold
 - both surface and upper air are warm
 - upper air is warm and surface air is cold
10. A cumulus cloud is recognized mainly by its
- obvious vertical dimension
 - darkness or color
 - precipitation
 - layered structure
 - association with high winds
11. Clouds are classified and named according to their altitude and
- water content
 - temperature
 - size of droplets in the cloud
 - form or appearance
 - amount of precipitation produced
12. "Anvil head" is a term applied to:
- cumulonimbus clouds
 - any high cloud
 - nimbostratus clouds
 - all clouds that form on the windward side of mountains
 - none of these
13. This method of frost prevention relies heavily on the release of latent heat of fusion:
- orchard heaters
 - sprinklers
 - smudge pots
 - wind machines
 - all of these
14. Cloud seeding with silver iodide is based on the
- Bergeron process
 - collision-coalescence process
 - both a and b
 - none of these
15. The air mass type most likely to form thunderstorms is
- mT
 - mP
 - cT
 - cA
 - none of these
16. An air mass is a body of air with
- equal density throughout
 - similar values of temperature and moisture in the horizontal
 - very high pressure everywhere
 - at least two frontal zones
 - very low humidity in its lower layers
17. Why are maritime air masses from the north Atlantic of only limited concern for weather in the U.S.?
- they never cause severe storms
 - prevailing winds move them away from the U.S.
 - temperatures are usually mild over this region
 - polar fronts block these air masses from the U.S.
 - question is incorrect; these air masses are very important

18. Characteristics of an air mass source region include
- a) sharp temperature contrasts
 - b) high elevation
 - c) uniformity of temperature and moisture
 - d) jet stream winds aloft
19. An air mass is often modified as it moves over the earth's surface. This modification is largely due to
- a) jet streams above
 - b) clouds
 - c) strong pressure gradients
 - d) lifting along fronts
 - e) contact with the ground below
20. An air mass from the Gulf of Mexico is called:
- a) cP
 - b) mP
 - c) cT
 - d) mT
21. A cT air mass is:
- a) cold and dry
 - b) cold and humid
 - c) warm and dry
 - d) warm and humid
 - e) none of these
22. An mP air mass is:
- a) dry and cold
 - b) humid and cold
 - c) dry and warm
 - d) humid and warm
 - e) none of these
23. The air masses that have the greatest influence on weather conditions in the Midwestern United States are:
- a) cP and mT
 - b) mP and cP
 - c) cT and cP
 - d) mP and mT
 - e) mT and cT
24. A warm front is said to exist when
- a) warm and cold air meet
 - b) invading cold air pushes underneath warmer air
 - c) moving cold air overrides warmer air
 - d) advancing warm air overrides retreating cold air
 - e) warm air pushes underneath cold air
25. The lifting of air and the resulting formation of clouds and rain is more gentle (gradual) for a
- a) warm front
 - b) cold front
 - c) mesocyclone
 - d) occluded front
 - e) divergence zone
26. The approximate lifetime of a wave cyclone is
- a) a month
 - b) 10 - 24 hours
 - c) 1 - 2 days
 - d) a few days to a week
 - e) 10 - 14 days

27. Why is the number and intensity of wave cyclones greatest during the late fall, winter and spring months?
- a) air is drier then
 - b) density of the air is greatest
 - c) temperature contrasts are greater
 - d) temperatures are below freezing
 - e) meteorologists don't know
28. After a cold front passes, which of these does not usually occur?
- a) marked temperature drop
 - b) wind direction shift
 - c) clearing skies
 - d) drop in relative humidity
 - e) falling barometer
29. The development of major winter storms in the midwest depends strongly on
- a) wind speed near the surface
 - b) wind speed aloft
 - c) amount of snow already on the ground
 - d) air mass contrasts
 - e) rainfall amounts during the previous fall
30. Which of these is common to both cold and warm fronts?
- a) light to calm winds
 - b) lifting of warm air over cold
 - c) decreasing precipitation rates
 - d) divergence of surface winds
 - e) steady barometer readings
31. Compared to other types of fronts, the weather associated with a cold front usually
- a) covers more area
 - b) is less violent but of longer duration
 - c) involves less precipitation
 - d) is more violent but of shorter duration
 - e) does not involve thunderstorms
32. Another common term for the wave cyclone is:
- a) tropical cyclone
 - b) anticyclone
 - c) polar-front cyclone
 - d) intertropical convergence zone
 - e) none of these
33. On a weather map, _____ fronts are shown with triangular points on one side of the front and semicircles on the other.
- a) warm
 - b) cold
 - c) occluded
 - d) stationary

Refer to the diagram below of a mature wave cyclone.

34. Refer to Table 9-1:
Line A-B represents:
a) a cold front
b) an occlusion
c) a warm front
d) an isobar
e) none of these



35. Refer to Table 9-1, the lowest pressure would be found at which one of the following points?
a) point A
b) point B
c) point J
d) point D
e) point E
36. Refer to Table 9-1:
Which of the following best represents the wind direction at point H?
a) NE
b) E
c) NW
d) SW
e) SE
37. Refer to Table 9-1: Which of the stations listed below should have the highest temperature?
a) point A
b) point E
c) point F
d) point H
e) point J
38. Refer to Table 9-1:
A low-flying aircraft heading from point J to point H would most likely experience which of the following changes in wind direction?
a) SE to SW to NW
b) NE to N to NW
c) SW to SE to NE
d) N to S to W
e) E to W to NE

39. Refer to Table 9-1:
Line A-D probably represents:
- a cold front
 - a warm front
 - an occluded front
 - a stationary front
40. Refer to Table 9-1:
Of the stations listed below, which one most likely has the least rain and cloud cover?
- point A
 - point B
 - point G
 - point I
 - point H
41. Over the last 20 years, which of these has caused the fewest weather related deaths in the U.S.?
- lightning
 - floods
 - tornadoes
 - hurricanes
42. What causes the dissipating stage of a thunderstorm?
- spreading downdraft cuts off air inflow
 - release of latent heat within the cloud
 - converging surface winds
 - converging winds aloft
 - loss of radiant energy from cloud top
43. Why do most tornadoes in the central U.S. occur during the spring months?
- upper-air temperatures are warmest
 - air-mass contrasts are greatest
 - divergence of air aloft is greatest
 - surface air is most humid
 - solar energy is a maximum
44. Why is strong heating of the ground by the sun associated with thunderstorms?
- leads to greater instability
 - reduces the relative humidity
 - reduces the dew point
 - increases the pressure gradient
 - increases the wind speed
45. The gust front occurs
- on the lee shore of the Great Lakes
 - near the anvil part of a thunderstorm cloud
 - during the development of thunderstorm clouds
 - at the leading edge of a thunderstorm downdraft
46. Thunderstorm tops most likely occur
- in the lower troposphere
 - in the mesosphere
 - near the tropopause
 - in the middle stratosphere
47. A tornado is a small, very intense example of the
- cyclone
 - anticyclone
 - coriolis effect
 - geostrophic wind
 - jet stream

48. Hurricanes and midlatitude cyclones are similar in that:
- a) both are areas of low pressure
 - b) both have conspicuous surface fronts
 - c) both are most common and well-developed in the winter season
 - d) both form in the trade-wind belt
49. The terms leader, flash, and stroke are used when describing:
- a) a tornado
 - b) the stages of a thunderstorm
 - c) the passage of a hurricane
 - d) squall line formation
 - e) none of these
50. Which of the following should have the steepest pressure gradient?
- a) tornado
 - b) middle-latitude cyclone
 - c) hurricane
 - d) a, b and c should have equally steep pressure gradients
 - e) both a and c have equally steep pressure gradients
51. Tornadoes most often move toward what direction?
- a) west
 - b) southeast
 - c) northeast
 - d) northwest
 - e) southwest
52. "Heat lightning":
- a) is brighter than ordinary lightning
 - b) is also called "ball lightning"
 - c) occurs more than 20 kilometers from the person observing it
 - d) is actually a display of the northern lights
53. The formation of tornadoes is associated with:
- a) severe thunderstorms
 - b) cold fronts
 - c) middle-latitude cyclones
 - d) all of the above
54. Downdrafts and updrafts found side by side relate to the _____ in the development of a thunderstorm.
- a) cumulus stage
 - b) mature stage
 - c) dissipating stage
55. Downdrafts totally dominate the _____ in the development of a thunderstorm.
- a) cumulus stage
 - b) mature stage
 - c) dissipating stage
56. Since detection and tracking of hurricanes is now quite accurate, why does damage from these storms continue to increase?
- a) poor forecasts of landfall area
 - b) hurricane intensity is greater
 - c) changes in tidal patterns
 - d) continued development of coastal areas
57. The initial detection and monitoring of tropical storms that may become hurricanes is accomplished by
- a) satellites
 - b) ocean buoys
 - c) aircraft
 - d) ocean ships
 - e) coastal observers

58. What general circulation wind belt is the place of origin for hurricanes?
- a) westerlies
 - b) doldrums
 - c) trade winds
 - d) horse latitudes
59. Why do surface wind speeds increase toward the center of a hurricane?
- a) reduced friction
 - b) stronger Coriolis effect
 - c) warmer water
 - d) conservation of angular momentum
60. What type of clouds is most common in a hurricane?
- a) cirrus
 - b) stratus
 - c) nimbostratus
 - d) cumulonimbus
61. Why do hurricanes initially form only in the tropics?
- a) stronger pressure gradients are found there
 - b) warm water temperatures are found there
 - c) subsiding air currents are found there
 - d) Coriolis is weaker there
62. What determines when a tropical depression or storm is given hurricane status?
- a) wind speed
 - b) central pressure
 - c) diameter
 - d) water temperature
63. What causes the winds of a hurricane to be so fast?
- a) stronger Coriolis force
 - b) weaker Coriolis force
 - c) very strong pressure gradient force
 - d) coupling with the jet stream
 - e) tidal effects
64. Hurricanes generally are:
- a) larger than tornadoes
 - b) smaller than midlatitude cyclones
 - c) areas of heavy rainfall and strong winds
 - d) most common in late summer and early fall
 - e) all of these
65. During which of the time spans listed below should hurricane formation in the North Atlantic be at a peak?
- a) January-February
 - b) April-May
 - c) August-September
 - d) November-December
66. Adiabatic processes are only important for air
- a) which is rising or sinking
 - b) that is stagnant
 - c) masses which remain near the earth's surface
 - d) that is polluted
 - e) that is saturated

67. The vertical motions that occur when the air is unstable are termed
- a) convergence
 - b) subsidence
 - c) cyclonic
 - d) geostrophic
 - e) convection
68. The buoyancy of a rising air parcel is greatly affected by
- a) wind speed
 - b) air pressure
 - c) heat released if water vapor condenses
 - d) absorption of solar radiation
 - e) convergence of the parcel
69. A stable atmosphere is one in which
- a) air layers are at their lowest elevations
 - b) temperatures are adiabatic
 - c) vertical motions are resisted
 - d) clouds are forming
 - e) rising bubbles of air accelerate upward
70. The stability of an air layer refers to its
- a) albedo
 - b) average temperature
 - c) pressure as measured at its base
 - d) tendency to either sustain or suppress vertical motions
 - e) overall density
71. An adiabatic process is one in which the
- a) altitude of the air parcel remains constant
 - b) heat exchanged with the surroundings is zero
 - c) pressure on the air parcel remains constant
 - d) temperature remains constant
 - e) work done is zero
72. The heat released when water vapor condenses to form a cloud or when liquid droplets freeze in a cloud
- a) makes the air heavier
 - b) cools off the cloud
 - c) evaporates more water
 - d) helps the cloud to rise higher
 - e) adds water to the cloud
73. The most important process of cloud formation in the atmosphere is:
- a) cooling by compression of air
 - b) cooling by release of latent heat of vaporization
 - c) cooling by expansion of air
 - d) radiation cooling
 - e) cooling by contact with a cold surface
74. Which of the following would not be associated with stable atmospheric conditions?
- a) widespread fog
 - b) temperature inversion
 - c) dreary overcast with light drizzle
 - d) buildup of pollutants
 - e) afternoon thundershowers

75. A parcel of air has a temperature of 0°C as it crosses a mountain range at 3000 meters. If it descends, what will its temperature be when it reaches sea level?
- a) 15°C
 - b) 30°C
 - c) 0°C
 - d) 40°C
 - e) none of these

76. Deserts such as the Great Basin, Gobi, and Takla Makan are examples of:
- a) chinook deserts
 - b) subtropical deserts
 - c) rain shadow deserts
 - d) monsoon deserts
 - e) none of these

77. Each of the statements refer to the approach or to the passage of a front. If the statement refers to the approach of a typical cold front, use the letter A for your answer. If the statement refers to the approach or passage of a typical warm front, use the letter B. Pressure tendency falling.

TRUE/FALSE

78. Clear skies are associated with subsidence or sinking motion.
79. Adiabatic temperature changes refer to parcels of air that rise or sink.

SPECIAL STUDY

80. Carefully study the California Lapse Rate Worksheet.
 Do you know how to compute a condensation level?
 Do you know when to use the dry lapse rate? The wet lapse rate?
 Do you know when to add temperature? Subtract temperature?
 Do you know why it is so hot in Death Valley even though the air was assumed to be adiabatic?
 Can you repeat these calculations if you are asked to?

ANSWER KEY FOR TEST

- | | | | |
|-------|-------|-------|----------|
| 1. b | 21. c | 41. d | 61. b |
| 2. c | 22. b | 42. a | 62. a |
| 3. d | 23. a | 43. b | 63. c |
| 4. c | 24. d | 44. a | 64. e |
| 5. a | 25. a | 45. d | 65. c |
| 6. e | 26. d | 46. c | 66. a |
| 7. b | 27. c | 47. a | 67. e |
| 8. a | 28. e | 48. a | 68. c |
| 9. d | 29. d | 49. e | 69. c |
| 10. a | 30. b | 50. a | 70. d |
| 11. d | 31. d | 51. c | 71. b |
| 12. a | 32. e | 52. c | 72. d |
| 13. b | 33. d | 53. d | 73. c |
| 14. a | 34. c | 54. b | 74. e |
| 15. a | 35. a | 55. c | 75. b |
| 16. b | 36. c | 56. d | 76. c |
| 17. b | 37. b | 57. a | 77. B |
| 18. c | 38. a | 58. c | 78. T |
| 19. e | 39. c | 59. d | 79. True |
| 20. d | 40. e | 60. d | |