1. The shape of the Earth is best described as a(n) _______________.
   a. perfect sphere
   b. ellipsoid
   c. oblate ellipsoid
   d. spherical ellipsoid

2. The direction of the Earth’s rotation is _______________ when viewed from above the north pole, or from _______________ if viewed from directly above the equator with the north pole on top.
   a. clockwise, west to east
   b. clockwise, east to west
   c. counterclockwise, east to west
   d. counterclockwise, west to east

3. The ___________________ is a phenomenon, related to the Earth’s rotation that causes air and ocean currents to deflect to the right of their direction of motion in the northern hemisphere and to the left of their direction of motion in the southern hemisphere.
   a. Van Allen effect
   b. Coriolis effect
   c. Bayer-Hoffman effect
   d. centripetal force effect

4. On the Earth’s surface, the geographic grid consisting of intersecting parallels and meridians are identified by______________, respectively.
   a. latitudes and longitudes
   b. longitudes and latitudes
   c. time and space
   d. azimuth and space

5. All meridians converge at points located at the _____________.
   a. equator
   b. tropic of cancer
   c. arctic and Antarctic circles
   d. poles

6. The ___________________ projection is a rectangular grid of meridians and parallels depicted as straight vertical and horizontal lines, respectively.
   a. polar
   b. Goode
   c. Mercator
   d. conic

7. While the _______________ projection portrays the relative areas of landmasses on the Earth’s surface correctly, their shapes however become distorted near the poles.
   a. Mercator
   b. Goode
   c. conic
   d. polar

8. ____________ time is based on twenty-four, ___________ degree wide time zones.
   a. Polar, 7 1/2
   b. World, 15
   c. Standard, 7 1/2
   d. Standard, 15
9. At 6:00 P.M. in New York (EST and 75W meridian), it is correspondingly __________ in Lake Tahoe, California (PST and 120W meridian).
   a. 9:00 P.M.
   b. 6:00 P.M.
   c. 3:00 A.M.
   d. 3:00 P.M.

10. The Earth completes a(n) _______________ revolution around the sun in _________ days.
    a. circular, 366
    b. elliptical, 365
    c. elliptical, 365 1/4
    d. circular, 365

11. The tilt of the Earth’s axis is _______________.
    a. 23 1/2 degrees from the plane of the ecliptic
    b. 66 1/2 degrees from a perpendicular to the plane of the ecliptic
    c. 23 1/2 degrees from the sun
    d. 23 1/2 degrees from a perpendicular to the plane of the ecliptic

12. During an equinox, the circle of illumination passes through the _____________.
    a. north and south poles
    b. Antarctic circle
    c. Arctic circle
    d. Equator

13. At the __________ solstice, the North Pole is tilted toward the Sun, while at the __________ solstice, it is tilted away from the Sun.
    a. December, June
    b. June, December
    c. September, March
    d. March, September

14. In the case of electromagnetic energy, _______________ objects radiate more energy at shorter wavelengths than _______________ objects.
    a. hotter; cooler
    b. rotating, stationary
    c. cooler, hotter
    d. larger, smaller

15. The highest energy, shortest wavelength form of electromagnetic radiation emitted by the sun is:
    a. shortwave infrared
    b. visible light
    c. thermal infrared radiation
    d. ultraviolet radiation

16. The Earth, maintaining a significantly cooler surface temperature than the Sun, emits ________________.
    a. ultraviolet radiation
    b. shortwave infrared radiation
    c. longwave radiation
    d. visible light
17. A(n) _______________ is a large body of air with fairly uniform temperature and moisture characteristics.
   a. air source
   b. air resource
   c. climate zone
   d. air mass

18. The amount of incoming solar radiation or insolation, received by the surface of the Earth, is most dependent upon the _______________.
   a. angle at which the insolation is received by the Earth’s surface
   b. total solar radiation output of the sun
   c. amount of glacial coverage in a particular area
   d. amount of ocean surface in a particular region

19. The _______________ region(s) of the Earth receives the greatest amount of insolation.
   a. polar
   b. equatorial
   c. midlatitude
   d. subtropical

20. On an annual basis, the Earth’s Polar Regions receive about _______________ of the insolation received at the equator.
   a. Thirty percent
   b. Fifty percent
   c. Sixty percent
   d. Seventy percent

21. The Earth’s _______________ regions have the greatest insolation variation.
   a. polar
   b. equatorial
   c. midlatitude
   d. tropical

22. Of the following gases, _______________ is not found in the atmosphere in measurable quantities.
   a. nitrogen
   b. helium
   c. argon
   d. carbon dioxide

23. Of the following gases, _______________ is the major atmospheric greenhouse gas.
   a. nitrogen
   b. argon
   c. carbon dioxide
   d. oxygen

24. The chemical formula __________ represents that of ozone.
   a. O₂
   b. O³
   c. O₃
   d. CO₂

25. Of the following gases, _______________ result(s) in the most prolific destruction of ozone.
   a. nitrogen
   b. carbon dioxide
   c. chlorofluorocarbons (CFCs)
   d. argon
26. __________ is a natural ozone layer destroying product.
   a. Carbon dioxide  
   b. Volcanic dust  
   c. Argon  
   d. Salt spray from the oceans

27. Scattered radiation moving in all directions through that atmosphere is known as
   __________.
   a. diffuse radiation  
   b. diffuse reflection  
   c. direct radiation  
   d. refracted radiation

28. ______________ from the atmosphere helps to warm the Earth’s surface through a process
   known as the ________________.
   a. Outbound longwave radiation, ozone effect  
   b. Insolation, greenhouse effect  
   c. Counterradiation, greenhouse effect  
   d. Counterradiation, ozone effect

29. Ocean heat circulation acts to move warm water on the __________ and colder water
   __________ of an ocean.
   a. bottom, on the surface  
   b. surface, on the bottom  
   c. surface, along the thermocline  
   d. bottom, along the thermocline

30. __________ is the difference between all incoming and outgoing radiations.
   a. Net radiation  
   b. Counterradiation  
   c. The greenhouse effect  
   d. Albedo

31. ______________, driven by the imbalance in net radiation between low and high latitudes,
   is the power source for ocean currents and broad-scale atmospheric circulation patterns.
   a. Midlatitude heat transfer  
   b. Poleward heat transfer  
   c. Surface net radiation  
   d. Energy balance

32. Temperature is ______________.
   a. a measure of the level of sensible heat of matter  
   b. only measured with a thermistor  
   c. a measure of the level of latent heat of matter  
   d. measured only through advection

33. Heat in the atmosphere is distributed through a vertical mixing process called
   ____________.
   a. advection  
   b. particle acceleration  
   c. convection  
   d. conduction
34. It is often hottest in the late afternoon because
   a. that is when the Sun’s rays are the most intense
   b. that is when the angle of the Sun’s rays is highest
   c. that is when it is driest
   d. that is when the Earth’s radiation out is finally greater than the Sun’s radiation in

35. Minimum daily temperatures usually occur _______________.
   a. just before sunrise
   b. at midnight
   c. one hour before sunrise
   d. about one-half hour after sunrise

36. Urban surface temperatures tend to be warmer than rural temperatures during the day because:
   a. drier surfaces are cooler than wet soils
   b. drier surfaces have less water to evaporate than do moist soils
   c. paved surfaces reflect so much heat away into the air
   d. paved surfaces absorb little solar insolation

37. _______________ is the process whereby plants loose a portion of their acquired water to the air through evaporation.
   a. Radiation
   b. Sublimation
   c. Respiration
   d. Transpiration

38. The defining characteristic of the troposphere is its _______________.
   a. poorly mixed atmospheric gases
   b. paucity of weather
   c. environmental temperature lapse rate
   d. precipitation lapse rate

39. The ___________ is noted for the fact that air warms as altitude increases to a height of about thirty miles (50 kilometers).
   a. troposphere
   b. mesosphere
   c. heterosphere
   d. stratosphere

40. A temperature inversion occurs when _______________.
   a. cold air lies atop warm air near the stratosphere
   b. warm air lies atop cold air near the stratosphere
   c. warm air lies atop cooler air next to the ground
   d. cold air lies atop warm air next to the ground

41. A very intense downdraft of air produced by a thunderstorm is called _______________.
   a. a tornado
   b. a hurricane
   c. a microburst
   d. sleet storm

42. The leading edge of a polar outbreak is _______________.
   a. a warm front which develops into an occluded front
   b. clear weather
   c. clear weather followed by warm and occluded fronts
   d. a cold front with squalls
43. A(n) _____________ is a sudden rise of water level caused by a hurricane.
   a. storm surge
   b. flood
   c. tsunami
   d. tidal flood

44. Since large bodies of water heat and cool more __________ compared to land surfaces,
   monthly temperature maximums and minimums tend to be delayed at coastal stations.
   a. slowly
   b. rapidly
   c. constantly
   d. randomly

45. ______________ are lines of equal temperature drawn on a weather map.
   a. Isohyets
   b. Isobars
   c. Isopachs
   d. Isotherms

46. Relative to adjacent ocean surfaces, isotherms over a large continental land masses in the
   northern hemisphere tend to shift ______________ in latitude during the winter and
   ______________ in latitude during the summer.
   a. north; south
   b. south; north
   c. west; east
   d. east; west

47. ______________ is not a greenhouse gas.
   a. Carbon dioxide
   b. Methane
   c. Argon
   d. Nitrous oxide

48. ______________ does not remove carbon dioxide from the atmosphere.
   a. A terrestrial photosynthesizing plant
   b. A marine photosynthesizing organism
   c. A decaying plant
   d. none of the above

49. The movement of water among the great global reservoirs constitutes the __________.
   a. water-factor cycle
   b. hydraulic cycle
   c. hydrologic cycle
   d. evaporation-precipitation cycle

50. ______________ energy is released or absorbed as water changes from one state to another.
   a. latent heat
   b. sensible heat
   c. conductive heat
   d. convective heat

51. Relative humidity ______________.
   a. is the total amount of water vapor present in the air
   b. is responsible for life on Earth
   c. depends upon the volume of water present in the air unrelated to temperature
   d. is the amount of water vapor in the air compared to the amount it could hold
52. Relative humidity is usually lowest during the ______________.
   a. early morning
   b. early afternoon
   c. evening
   d. night

53. ______________ temperature changes occur in parcels of air solely as a result of air
   expansion or compression.
   a. Adiabatic
   b. Compressive
   c. Latent
   d. Specific

54. Since rising air cools less rapidly when condensation is occurring as a result of the
   release of latent heat, the ________ has a lesser value than the ______________.
   a. dry adiabatic lapse rate; wet adiabatic lapse rate
   b. dry adiabatic lapse rate; environmental adiabatic lapse rate
   c. environmental adiabatic lapse rate; wet adiabatic lapse rate
   d. wet adiabatic lapse rate; dry adiabatic lapse rate

55. ______________ precipitation is a result of air being lifted over a highland area.
   a. Convective
   b. Orographic
   c. Convergence
   d. Frontal

56. ______________ lifting of air is due to heating.
   a. Convective
   b. Orographic
   c. Frontal
   d. Adiabatic

57. The ______________ lapse rate is in effect when a parcel of air rises above the condensation
   level.
   a. environmental
   b. adiabatic
   c. dry adiabatic
   d. wet adiabatic

58. ______________ air masses generally possess the lowest moisture content.
   a. Maritime tropical
   b. Continental polar
   c. Maritime tropical
   d. Continental tropical

59. In middle and high latitudes, the dominant form of weather system is the ______________,
   a large inspiral of air that repeatedly forms, intensifies, and dissolves along the polar front.
   a. mid-latitude warm front
   b. mid-latitude wave anticyclone
   c. mid-latitude wave cyclone
   d. mid-latitude cold front

60. Smog has three toxic ingredients of which ______________ are (is) not a member.
   a. nitrogen oxides
   b. hydrocarbons
   c. polycarbonates
   d. ozone
61. An occluded front occurs within a wave cyclone _______________.
   a. on every occasion of warm front formation
   b. on every occasion of cold front formation
   c. whenever a cP air mass meets a mE air mass
   d. when a cold front has overtaken a warm front and converged with the leading cold front

62. Acid deposition is produced by the release of sulfur dioxide and __________ into the air.
   a. carbon dioxide
   b. ozone
   c. nitric oxide
   d. sulfur perchlorate

63. A barometer is an instrument used to measure __________.
   a. air pressure
   b. hydraulic pressure
   c. tectonic pressure at earthquake fault zones
   d. glacial compression under ice sheets

64. As an individual moves higher in elevation, the ______________.
   a. easier it is to breathe because the air is cleaner and fresher
   b. easier it is to breathe because the air is thinner and therefore cleaner
   c. harder it is to breathe because the air molecules are closer together
   d. harder it is to breathe because the air is thinner

65. The boiling point of water lowers as one goes higher in elevation because ____________.
   a. water is less dense at the higher elevation
   b. air is denser at the higher elevation
   c. air pressure is less at the higher elevation
   d. upwards water pressure is much greater

66. On weather maps ____________ connect lines of equal atmospheric pressure.
   a. isobars
   b. isotherms
   c. pressure contours
   d. isohyets

67. A land breeze generally occurs ______________.
   a. at nightfall, when the land cools below the surface temperature of the sea
   b. when strong winds blow in from the sea over the land
   c. only during certain restricted seasons
   d. during the day when the land heats above the surface temperature of the sea

68. A parcel of air is subjected to three forces and the balance among the ______________, Coriolis, and frictional forces determines the direction of motion of the parcel of air.
   a. gravitational
   b. pressure gradient
   c. centrifugal
   d. divergent

69. The Coriolis effect is ______________.
   a. a result of the Earth’s rotation from east to west
   b. a result of the Earth’s rotation from the west to the east and causes objects to curve to the right in the Northern Hemisphere
   c. a result of the Earth’s rotation from the west to the east and causes objects to curve to the left in the Northern Hemisphere
   d. unrelated to other physical phenomena on the Earth
70. Strong wind convergence in association with the ITCZ generally occurs at __________ degrees latitude.
   a. zero
   b. thirty
   c. forty-five
   d. sixty

71. In the Hadley cell convection loop, air rises at the ITCZ and descends in the ___________.
   a. polar high-pressure cells
   b. subpolar low-pressure cells
   c. subtropical high-pressure cells
   d. polar low-pressure cells

72. The movement of the ITCZ and the change in the pressure pattern with the seasons create a reversing wind pattern in Asia known as the ___________ where cool-dry air flow from the northeast dominates during the low-Sun season and warm-moist airflow from the southwest dominates during the high-Sun season.
   a. northeast trades
   b. southeast trades
   c. monsoon
   d. westerlies

73. At upper levels in the atmosphere, as a parcel of air moves in response to a pressure gradient, it is turned progressively sidewards until the gradient and Coriolis forces balance to produce the ___________.
   a. geostrophic wind
   b. tropospheric wind
   c. upper-air westerlies
   d. equatorial easterlies

74. Jet streams are ___________.
   a. narrow zones at a high altitude in which wind streams reach great speeds over the speed of sound
   b. narrow zones at a high altitude in which wind streams reach great speeds of over 200 miles per hour
   c. rivers of wind that only exist along the equator and travel at fairly high velocities
   d. well known for shredding aircraft when they inadvertently enter them

75. Global surface ocean currents are dominated by huge, wind-driven circular ___________ centered near the subtropical high-pressure cells.
   a. gyres
   b. currents
   c. circulations
   d. thermo-haline currents