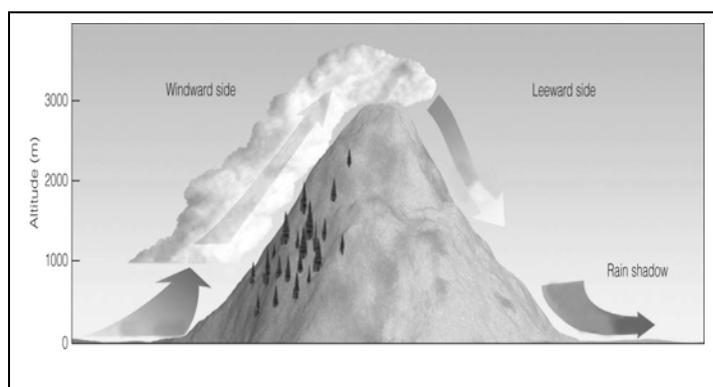
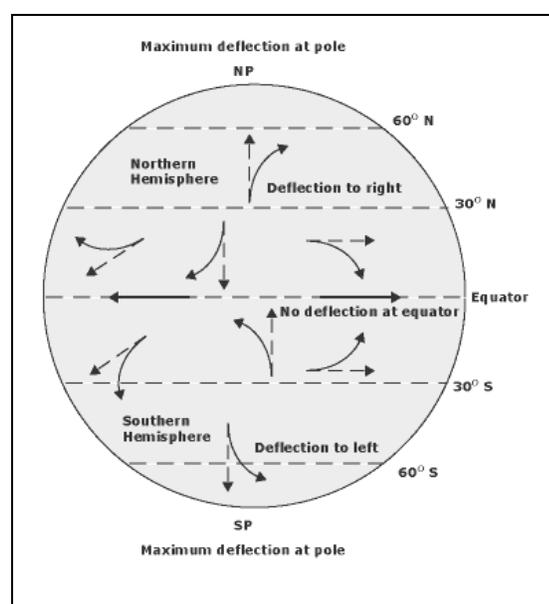


Select the **best answer** to the questions and completely darken the appropriate bubble on the scantron (2 pts. each)

- Rainwater is naturally acidic because it contains dissolved:**
  - HCl – hydrochloric acid
  - CaCO<sub>3</sub> – calcium carbonate
  - H<sub>2</sub>SO<sub>4</sub> – sulfuric acid
  - H<sub>2</sub>CO<sub>3</sub> – carbonic acid
- Which of the following statements about sinkhole formation is incorrect?**
  - Permafrost thaw is a way that a sinkhole can form.
  - Cover collapse is a way that a sinkhole can form.
  - Large caverns generally form in limestone just below the water table.
  - Cover subsidence is a way that a sinkhole can form.
  - Sinkhole formation depends on the presence of soluble sedimentary rocks like limestone.
- In an area of limestone, if the water table drops, the roof of a cavern is most likely to:**
  - increase the volume of water in the cavern
  - form stalagmites and stalactites
  - collapse
  - dissolve creating large voids
  - none of the above
- Which of the following would NOT be likely if global warming continues?**
  - a general lowering of mean sea level
  - a rise in temperatures in most polar regions
  - expansion of the ranges of tropical diseases into higher latitudes
  - changes in ocean currents resulting from changes in salinity
  - more intense rainfall and more serious droughts in semi-arid regions
- The rate at which temperature decreases with increasing altitude is called the \_\_\_\_\_.**
  - temperature slope
  - sounding
  - adiabatic lapse rate
  - thermocline
  - none of these
- Carbonate rocks commonly have caverns in them because:**
  - H<sub>2</sub>CO<sub>3</sub> – carbonic acid dissolves carbonate rocks
  - earthquakes create voids during ground vibration
  - magma chambers within the rocks empty during volcanic eruption
  - they commonly contain coal that is removed by mining
- Weather refers to conditions of the atmosphere at a particular place in time and includes measurement of:**
  - temperature
  - dewpoint
  - humidity
  - pressure
  - all of the above
- The effect illustrated to the right of rising moisture-rich air mass is an example of:**
  - Föhn wind
  - orographic cooling
  - the jet stream
  - the Coriolis force
  - a frontal boundary
- Low pressure systems in the northern hemisphere result in:**
  - air rotation on Earth's surface in a clockwise direction
  - sinking air
  - air converging at the Earth's surface
  - air diverging at the Earth's surface
  - none of the above



- 10. Earth's orbit around the sun changes from circular to elliptical about every 100,000 years, a long-term process known as:**
- the adiabatic lapse rate
  - Milankovitch cycles
  - the coriolis effect
  - El Nino
  - a Dolan-Davis cycle
- 11. When Post-tropical storm Sandy made landfall in southern New Jersey, its windspeeds on the Saffir-Simpson Scale would indicate the storm was equivalent to a Category \_\_\_\_ hurricane.**
- 1
  - 2
  - 3
  - 4
  - 5
- 12. Hurricane (Post-tropical) Sandy changed its forward motion from northeast to northwest, thus impacting the NJ shoreline because:**
- steering currents
  - a southern dip in the jetstream created strong wind motion from SE to the NW
  - winds that normally blow from SW to NE at this latitude relaxed before landfall
  - the ocean heat source used by hurricanes was not present as this latitude thus the storm turned toward the coast because of industrial development
  - none of the above
- 13. Which of the following areas has suffered ground subsidence because of the removal of groundwater?**
- Long Beach, CA
  - Mexico City
  - Raleigh, NC
  - Venice, Florida
  - New York City
- 14. The temperature at which air's relative humidity is 100% is called the:**
- adiabatic lapse rate
  - saturation point
  - precipitation point
  - dew point
  - none of the above
- 15. Why are coastal houses in hurricane areas generally on tall posts?**
- to keep them above the level of high waves
  - to provide less wind resistance
  - to let blowing sand go under them
  - to keep them above the strongest winds
  - to keep them above the level of the storm surge
- 16. A(n) \_\_\_\_\_ is a depression formed by the collapse of the ground into an underground cavity.**
- earth fissure
  - sinkhole
  - sackung
  - fault
  - aquifer
- 17. The diagram to right illustrates:**
- the adiabatic lapse rate
  - El Nino
  - Milankovitch cycles
  - the coriolis effect
  - a Dolan cycle
- 18. Post-tropical storm Sandy resulted in a record storm surge that affected NYC's Lower Manhattan of about:**
- 5'
  - 8'
  - 10'
  - 14'
  - 20'



- 19. The most costly hurricane to impact the U.S. as far as total estimated dollars loss was:**
- A. Katrina
  - B. Hugo
  - C. Ike
  - D. Camille
  - E. Hazel
- 20. Increasing ocean acidity results in:**
- A. increasing the availability of ocean organisms to precipitate calcite
  - B. stresses the ocean's coral reefs resulting in their possible dying off
  - C. enhancing the ability of predators to capture their prey
  - D. a reduction in the amount of CO<sub>2</sub> dissolved in seawater
  - E. none of the above
- 21. Sandy was a late season hurricane that originated:**
- A. off the Cape Verde islands in the eastern Atlantic
  - B. in the Georgia Bight of the Atlantic Ocean between Florida and the Bahamas
  - C. in the Gulf of Mexico
  - D. in the Caribbean
  - E. none of the above
- 22. A hurricane warning is issued by the National Hurricane Center when:**
- A. a hurricane is expected in the warning area within 48 hours
  - B. a hurricane is expected in the warning area within 36 hours
  - C. a hurricane is expected in the warning area within 12 hours
  - D. a hurricane is expected in the warning area within 24 hours
  - E. none of the above
- 23. Ground surface subsidence may be caused by:**
- A. extraction of petroleum and gas
  - B. long-term, extensive withdrawal of groundwater
  - C. drainage of organic soils
  - D. all of these choices
  - E. none of these choices
- 24. The NE quadrant of a westward moving hurricane experiences the highest winds and storm surge because:**
- A. It doesn't. The storm surge is highest right under the eye where the atmospheric pressure is lowest.
  - B. It doesn't. The hurricane winds are highest both south and southwest of the eye, less farther away.
  - C. The winds are moving offshore there, so the waves and storm surge are larger.
  - D. The winds are moving onshore there rather than offshore, so there is much greater fetch or open water for the wind to blow over
- 25. On the Dolan-Davis (1993) No'easter Scale, Post-tropical Storm Sandy would be assigned a class of:**
- A. I
  - B. II
  - C. III
  - D. IV
  - E. V
- 26. Although there are multiple reasons why Venice, Italy has canals for gondolas and boats instead of normal streets for cars, the main reason is \_\_\_\_\_.**
- A. It was built on soft muds of a lagoon, and the heavy buildings settled into the mud.
  - B. Since the city was built about 1,600 years ago, the sea level has significantly risen.
  - C. The low ground next to the lagoon was a difficult place to provide a good road foundation.
  - D. Extraction of groundwater below the city caused subsidence of the city below sea level.
  - E. None of the above.
- 27. Other than limestone, what other types of rocks are soluble and can form cavities that collapse?**
- A. sandstone
  - B. salt and gypsum
  - C. shale and bauxite
  - D. clays
  - E. granite

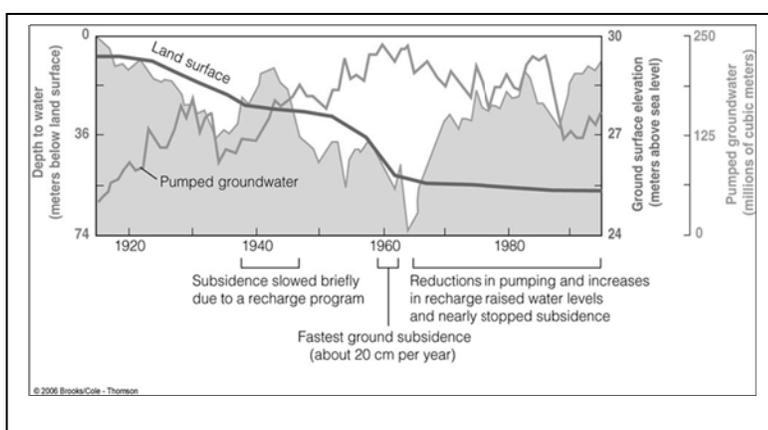
- 28. Where in North America are sinkholes most prevalent and why?**
- in Michigan, because outcrops of limestone are widespread and it is surrounded by the Great Lakes
  - in Florida, because it is almost all limestone and has abundant groundwater
  - in Washington state, because of all of the rain west of the Cascades
  - in metamorphic rocks of the Canadian Shield, because of all of the lakes
  - in Colorado, because layers of sedimentary rocks under the Great Plains bend up to the surface there
- 29. What two main factors cause increased height of a storm surge?**
- high winds pushing the water
  - high atmospheric pressure
  - low atmospheric pressure and strong hurricane winds
  - high waves driven by strong winds
  - high winds pushing high waves into shallow water
- 30. Why is storm damage of a westward-moving hurricane generally less on the south side of the eye?**
- It isn't. The storm surge is highest right under the eye where the atmospheric pressure is lowest.
  - It isn't. The hurricane winds are highest both just north and just south of the eye, less farther away.
  - The winds are moving offshore there, so the waves are smaller. The storm surge is north of the eye.
  - The winds are moving offshore there rather than onshore, so the debris travels over open water rather than colliding with buildings.
  - none of these
- 31. What local circumstances raised the height of Sandy's onshore storm surge?**
- Coastal vegetation, such as thick groves of mangroves, raised the height of a storm surge onshore close to the beach.
  - Approaching the coast, the hurricane moved slower toward the coast.
  - Approaching the coast, the hurricane moved faster toward the coast.
  - The surge moved into a bay that funneled the water through a smaller area.
  - Low sand dunes raised the height of a storm surge onshore close to the beach.
- 32. Areas on Earth's surface where closed depressions, disappearing streams, or lack of surface water are common indicate that:**
- the soil is thin
  - the area is an arid region
  - we are in the piedmont of North Carolina
  - limestone underlies the area
  - none of the above
- 33. Collapse sinkholes, which are the most common in Florida, are characterized by:**
- surface wetlands
  - slow formation
  - high water table
  - gentle subsidence
  - rapid formation and deep, steep sides
- 34. Surface subsidence problems are common in western Pennsylvania; they are caused by:**
- limestone dissolution and collapse
  - underground mining
  - groundwater removal
  - earthquakes
  - all of the above
- 35. Why are skies clear in the eye of a hurricane?**
- Warm air is rising.
  - Warm, dry air is descending.
  - Cold, dry air is descending.
  - Cold air is rising.
  - Any moisture is flung to the edge of the eye wall by centrifugal forces.
- 36. The San Joaquin Valley in California has experienced significant ground subsidence because of:**
- underground cavities in carbonates
  - groundwater extraction for irrigation
  - excessive surface construction with concomitant surface weight increase

- D. the area is located along a major fault that slowly settles  
E. none of the above
- 37. Which way do hurricane winds move?**  
A. counterclockwise, and downward inside the eye  
B. counterclockwise, and upward inside the eye  
C. clockwise, outward from the eye, upward outside the eye, and downward inside the eye  
D. clockwise, inward toward the eye, upward outside the eye, and downward inside the eye  
E. None of the above
- 38. Where in a hurricane are the winds strongest?**  
A. in the eye  
B. just outside the eye (in the eye wall)  
C. half way out to the outer fringe of the hurricane  
D. at the outer fringe  
E. center of the surge
- 39. Hurricane season is from June through November; however, the month of \_\_\_\_\_ is the peak part of the season with the most number.**  
A. July, because that is the hottest month and rainfall is highest in the tropics  
B. July, because winds are the highest over the normally stagnant doldrums of the equatorial ocean  
C. July to August, because those are the hottest months  
D. September, because it takes all summer to warm the ocean  
E. October–November, because it takes all summer to warm the ocean
- 40. Where in a hurricane is the atmospheric pressure lowest, and approximately how low can that be?**  
A. lowest in the zone of high winds, just outside the eye; as low as 950 millibars  
B. lowest just outside the eye wall; as low as 920 millibars  
C. lowest in the eye; as low as 920 millibars  
D. lowest in the eye; as low as 1,200 millibars  
E. lowest in the zone of high winds, midway between the eye and its outer fringes; as low as 950 millibars
- 41. Hurricanes striking the east coast of North America originate \_\_\_\_\_**  
A. the central Pacific Ocean, near the equator  
B. in the Gulf of Mexico  
C. off the north Coast of South America, near the equator  
D. near-equatorial latitudes off the west coast of Africa  
E. in the steamy jungles of the Congo, in western Africa
- 42. Where does a tropical cyclone or hurricane get its energy?**  
A. in the heat and moisture rising from low pressure cells in the warm equatorial ocean  
B. from heat of the sun shining off a hot desert near the equator  
C. from high temperatures of a humid high pressure weather cell near the equator  
D. from high summer temperatures over humid equatorial jungles  
E. none of these
- 43. Why are storms found at both warm fronts and cold fronts?**  
A. In both cases, the warm, more-humid air rises rapidly over cold air, cooling, condensing, and raining.  
B. Where a warm front collides with a cold front, the friction between them generates heat and storms.  
C. In both cases, the northward-moving front goes to the right, so the storm cell formed turns counterclockwise.  
D. Warm fronts concentrate static positive charges; cold air concentrates negative charges. They storm where the two collide.  
E. Warm and cold airs do not mix easily because of their different densities, so the turbulence causes storms.
- 44. What is the jet stream?**  
A. a narrow high velocity stream of high altitude air between warm equatorial air and cool air to the north that blows from west to east  
B. a high speed stream of air carried east to west by the high-altitude trade winds  
C. a stream of air confined between cold air in the upper atmosphere and warm air below  
D. a low speed stream of air circulating high-pressure cells

45. Greenhouse gases include all of the following except \_\_\_\_\_.
- methane
  - radon
  - nitrous oxide
  - carbon dioxide
  - chlorofluorocarbons
46. As air temperature rises, its ability to hold water vapor \_\_\_\_\_.
- increases
  - decreases
  - stays constant
  - increases, then remains constant
  - increases, then decreases
47. When air contains the maximum amount of water vapor that it can hold, it is called what?
- its capacity
  - saturation deficit
  - relative humidity
  - precipitation potential
  - hydrologic cycle
48. The process by which plants give up moisture to the air is called \_\_\_\_\_.
- sublimation
  - evaporation
  - transpiration
  - evapotranspiration
  - none of these

49. The graph on right indicates that land surface subsidence increases with:

- pumping of groundwater
- pumping of groundwater
- does not change with pumping of groundwater
- has no relationship



50. Why does a mass of air get cooler as it rises over a mountain?

- The air gets cooler because it loses heat to its surrounding cool air.
- The air gets cooler because nearby ice and snow are cold.
- The air gets cooler because the dry air at high elevations conducts heat away easily.
- Air with a certain amount of heat expands as it rises so that heat is distributed through a larger volume.
- The air gets cooler because there is more air pressure at the top of the mountain

-----Tear and Turn in Below-----

NAME: \_\_\_\_\_

**BONUS (5 points)** - What energy source should the U.S. increase in use that will help reduce domestic CO<sub>2</sub> production and why?"