

ESS55: Earth's Atmosphere / Homework #3 (due 4/23/2009)

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- _____ 1. In the Northern Hemisphere, this day has the fewest hours of daylight:
 - a. summer solstice
 - b. winter solstice
 - c. vernal equinox
 - d. autumnal equinox

- _____ 2. During the winter solstice in the Northern Hemisphere:
 - a. astronomical winter begins in the Northern Hemisphere
 - b. the noon sun is overhead at 23.5° S latitude
 - c. at middle latitudes in the Northern Hemisphere, this marks the longest night of the year
 - d. all of the above

- _____ 3. Which latitude below would experience the fewest hours of daylight on Dec. 22?
 - a. 60° S
 - b. 20° S
 - c. 0° (Equator)
 - d. 20° N
 - e. 60° N

- _____ 4. Where are the days and nights of equal length all year long?
 - a. at 66.5°
 - b. nowhere
 - c. at 23.5°
 - d. at the Equator

- _____ 5. In the middle latitudes of the Northern Hemisphere on June 22, the sun:
 - a. rises in the east and sets in the west
 - b. rises in the southeast and sets in the southwest
 - c. rises in the northeast and sets in the northwest
 - d. rises in the northeast and sets in the southwest
 - e. rises in the southeast and sets in the northwest

- _____ 6. Which of the following helps to explain why even though northern latitudes experience 24 hours of sunlight on June 22, they are not warmer than latitudes further south?
 - a. solar energy is spread over a larger area in northern latitudes
 - b. some of the sun's energy is reflected by snow and ice in the northern latitudes
 - c. increased cloud cover reflects solar energy in the northern latitudes
 - d. solar energy is used to melt frozen soil in the northern latitudes
 - e. all of the above

- _____ 7. The sun is directly overhead at Mexico City (latitude 19°N):
 - a. once a year
 - b. twice a year
 - c. four times a year
 - d. never

Name: _____

- _____ 8. On what day would you expect the sun to be overhead at Lima, Peru (latitude 12° S)?
- August 15
 - December 22
 - February 4
 - March 10
 - April 21
- _____ 9. The maximum in daytime surface temperature typically occurs _____ the earth receives its most intense solar radiation.
- before
 - after
 - exactly when
- _____ 10. Radiational cooling typically occurs
- during the afternoon
 - at night
 - during the late morning
- _____ 11. The strongest radiation inversions occur when
- skies are overcast
 - skies are partly cloudy
 - skies are clear
 - precipitation is falling
- _____ 12. When it is January and winter in the Northern Hemisphere, it is _____ and _____ in the Southern Hemisphere.
- January and summer
 - January and winter
 - July and winter
 - July and summer
- _____ 13. The most important reason why summers in the Southern Hemisphere are not warmer than summers in the Northern Hemisphere is that:
- the earth is closer to the sun in January
 - the earth is farther from the sun in July
 - over 80% of the Southern Hemisphere is covered with water
 - the sun's energy is less intense in the Southern Hemisphere
- _____ 14. For maximum winter warmth, in the Northern Hemisphere, large windows in a house should face:
- north
 - south
 - east
 - west
- _____ 15. To protect fruit trees from frost, it is important to keep the air as still as possible.
- true
 - false
- _____ 16. During a radiation inversion, wind machines
- bring warm air down toward the surface
 - lift cool, surface air to higher altitudes
 - mix the air near the ground
 - all of the above

Name: _____

- _____ 17. The main reason(s) for warm summers in middle latitudes is that:
- the earth is closer to the sun in summer
 - the sun is higher in the sky and we receive more direct solar radiation
 - the days are longer
 - all of the above
 - only (b) and (c) are correct
- _____ 18. The earth is tilted at an angle of 23.5° with respect to the plane of its orbit around the sun. If the amount of tilt were increased to 40° , we would expect in middle latitudes:
- hotter summers and colder winters than at present
 - cooler summers and milder winters than at present
 - hotter summers and milder winters than at present
 - cooler summers and colder winters than at present
 - no appreciable change from present conditions
- _____ 19. Although the polar regions radiate away more heat energy than they receive by insolation in the course of a year, they are prevented from becoming progressively colder each year by the:
- conduction of heat through the interior of the earth
 - concentration of earth's magnetic field lines at the poles
 - circulation of heat by the atmosphere and oceans
 - the insulating properties of snow
 - release of latent heat to the atmosphere when polar ice melts
- _____ 20. Suppose you drive to and from work on a street that runs east to west. On what day would you most likely have the sun shining directly in your eyes while driving to and from work?
- summer solstice
 - winter solstice
 - autumnal equinox
 - during the summer months
- _____ 21. In July, at middle latitudes in the Northern Hemisphere, the day is _____ long and is _____ with each passing day.
- less than 12 hours, getting longer
 - less than 12 hours, getting shorter
 - more than 12 hours, getting longer
 - more than 12 hours, getting shorter
- _____ 22. In meteorology, the word insolation refers to:
- a well-constructed, energy-efficient home
 - the solar constant
 - incoming solar radiation
 - an increase in solar output
- _____ 23. During the afternoon the greatest temperature difference between the surface air and the air several meters above occurs on a:
- clear, calm afternoon
 - clear, windy afternoon
 - cloudy, calm afternoon
 - cloudy, windy afternoon
- _____ 24. The greatest variation in daily temperature usually occurs:
- at the ground
 - about 5 feet above the ground
 - at the top of a high-rise apartment complex
 - at the level where thermals stop rising

Name: _____

- _____ 25. In most areas the warmest time of the day about 5 feet above the ground occurs:
- around noon
 - in the afternoon between 2 and 5 pm
 - in the early evening after 6 pm
 - just before the sun sets
- _____ 26. In clear weather the air next to the ground is usually _____ than the air above during the night, and _____ than the air above during the day.
- colder, warmer
 - colder, colder
 - warmer, colder
 - warmer, warmer
- _____ 27. During an equinox:
- the days and nights are of equal length except at the poles
 - at noon the sun is overhead at the equator
 - the earth is not tilted toward nor away from the sun
 - all of the above
- _____ 28. The primary cause of a radiation inversion is:
- infrared radiation emitted by the earth's surface
 - infrared radiation absorbed by the earth's surface
 - solar radiation absorbed by the earth's surface
 - solar radiation reflected by the earth's surface
 - infrared radiation absorbed by the atmosphere and clouds
- _____ 29. Lines connecting points of equal temperature are called:
- isobars
 - isotherms
 - thermals
 - thermographs
- _____ 30. The largest annual ranges of temperatures are found:
- at polar latitudes over land
 - at polar latitudes over water
 - at middle latitudes near large bodies of water
 - at the Equator
 - in the Northern Central Plains of the United States

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Answer Section

MULTIPLE CHOICE

1. B
2. D
3. E
4. D
5. C
6. E
7. B
8. C
9. B
10. B
11. C
12. A
13. C
14. B
15. B
16. D
17. E
18. A
19. C
20. C
21. D
22. C
23. A
24. A
25. B
26. A
27. D
28. A
29. B
30. A

C 8. E 17. B 25.

 B 1. B 9. A 18. A 26.

 D 2. B 10. D 27.

 C 19.

 E 3. C 11. A 28.

 A 12. C 20.

 D 4. B 29.

 C 5. C 13. D 21. A 30.

 E 6. B 14. C 22.

 B 15. A 23.

 B 7. D 16.

 A 24.