

# Meteorology Pretest on Chapter 2

## MULTIPLE CHOICE

1. The earth emits terrestrial radiation
  - a) only at night
  - b) all the time
  - c) only during winter
  - d) only over the continents
  
2. If an imbalance occurs between incoming and outgoing energy at the earth's surface
  - a) minimum temperatures occur
  - b) maximum temperatures occur
  - c) temperatures either increase or decrease
  - d) temperatures remain steady
  
3. Why do atmospheric temperatures decrease with height in the troposphere?
  - a) air at higher levels is too thin
  - b) atmosphere is heated by the ground
  - c) solar radiation is weaker at higher levels
  - d) atmospheric path length is too long
  
4. Earth is closest to the sun during
  - a) No. hemisphere summer
  - b) No. hemisphere winter
  - c) So. hemisphere winter
  - d) No. hemisphere autumn
  - e) So. hemisphere autumn
  
5. Most of the solar energy absorbed by planet earth and its atmosphere is absorbed by
  - a) atmospheric gases
  - b) clouds
  - c) atmospheric dust
  - d) the earth's surface
  
6. The atmosphere is heated primarily by
  - a) absorption of solar radiation
  - b) conduction from the ground
  - c) absorption of earth radiation
  - d) convection from the ground
  
7. Clouds play an important role in the earth's energy budget because they
  - a) reflect solar energy
  - b) reflect the earth's infrared energy
  - c) absorb heat from the air
  - d) cool the air around them

8. Suppose the albedo of a planet is measured to be 40%. This means that
- 60% of the sun's energy is reflected
  - 40% of the sun's energy is absorbed
  - 40% of the sun's energy is reflected
  - none of these
9. All radiation emitted by the earth and its atmosphere is in the category of
- ultraviolet
  - gamma
  - blackbody
  - infrared
10. During natural processes, heat transfer is always from
- warmer to cooler substances
  - solids to liquids
  - cooler to warmer substances
  - either a) or c)
11. During the earth's orbit around the sun, the inclination (tilt) of the earth's axis
- varies from 0 to  $23.5^{\circ}$
  - remains constant at  $23.5^{\circ}$
  - varies from 0 to  $47^{\circ}$
  - remains constant at  $90^{\circ}$
12. The primary cause of the earth's seasons is
- inclination of earth's rotation axis
  - varying orbital speed
  - varying distance from the sun
  - regular changes in radiation emitted by the sun
  - changes in atmospheric thickness
13. Low sun angles result in reduced solar energy because
- energy is spread over a larger area
  - sun - earth distance is greater
  - atmospheric path length is longer
  - absorption is reduced
  - both a) and c)
14. The atmosphere is nearly \_\_\_\_\_ with respect to solar radiation.
- transparent
  - absorptive
  - reflective
  - conductive
15. Early in January the earth is closer to the sun than at any other time of year. This position is termed:
- albedo
  - perihelion
  - revolution
  - aphelion
  - equinox

16. Which of the following correctly describes the equinoxes?
- a) they occur in June and December
  - b) the sun's vertical rays are striking either the Tropic of Cancer or the Tropic of Capricorn
  - c) days and nights are equal in length in all parts of the world
  - d) the length of daylight at the Arctic and Antarctic Circle is 24 hours
  - e) none of the above statements is correct regarding the equinoxes
17. Marquette, MI is at  $47^{\circ}\text{N}$  latitude. What is the angle of the sun's noon rays here on December 22?
- a)  $33^{\circ}$
  - b)  $70\ 1/2^{\circ}$
  - c)  $43\ 1/2^{\circ}$
  - d)  $19\ 1/2^{\circ}$
  - e)  $47^{\circ}$
18. At  $45^{\circ}\text{S}$  latitude, the angle of the noon sun is lowest and the length of daylight is shortest on:
- a) January 23
  - b) September 22
  - c) March 21
  - d) June 21
  - e) December 21
19. The longest wavelengths on the electromagnetic spectrum are:
- a) infrared
  - b) ultraviolet
  - c) gamma
  - d) visible light
  - e) none of these
20. The wavelengths emitted by the earth are:
- a) longer than those emitted by the sun
  - b) shorter than those emitted by the sun
  - c) about the same as those emitted by the sun except when the sun is experiencing sunspots
  - d) none of these
21. The absorption of terrestrial radiation by certain gases in the lower atmosphere is called the:
- a) adiabatic effect
  - b) atmospheric window effect
  - c) photon effect
  - d) gray-body effect
  - e) greenhouse effect
22. On the average, how much of the sun's energy that is intercepted by the earth is reflected to space?
- a) 19%
  - b) 25%
  - c) 30%
  - d) 45%
  - e) 51%

23. The length of daylight gets progressively longer going south from the equator on
- a) June 21
  - b) March 21
  - c) September 22
  - d) December 21
  - e) none of these
24. The spring equinox in the Northern Hemisphere starts on
- a) June 21
  - b) March 21
  - c) September 22
  - d) December 21
  - e) none of these
25. The  $90^{\circ}$  angle rays are striking the Tropic of Cancer on
- a) June 21
  - b) March 21
  - c) September 22
  - d) December 21
  - e) none of these
26. The earth receives energy from the sun by
- a) conduction
  - b) convection
  - c) radiation
  - d) all of these (a, b, and c)
  - e) none of these
27. The process of \_\_\_\_\_ involves the movement of a mass or substance.
- a) conduction
  - b) convection
  - c) radiation
  - d) all of these
  - e) none of these
28. \_\_\_\_\_ is a mechanism of heat transfer.
- a) conduction
  - b) convection
  - c) radiation
  - d) all of these
  - e) none of these
29. Wind is an example of
- a) conduction
  - b) convection
  - c) radiation
  - d) all of these (a, b, and c)
  - e) none of these

30. The transfer of heat through matter by molecular activity is called
- a) conduction
  - b) convection
  - c) radiation
  - d) all of these (a, b, and c)
  - e) none of these
31. At what time of year is the earth's axis not tilted either toward or away from the sun?
- a) autumnal equinox
  - b) summer solstice
  - c) winter solstice
  - d) a, b, and c
  - e) none of these
32. During the spring equinox in the northern hemisphere, the circle of illumination passes directly through the
- a) equator
  - b) Tropic of Cancer
  - c) Tropic of Capricorn
  - d) poles
  - e) none of these
33. Convection is least likely to happen in a
- a) liquid
  - b) solid
  - c) gas
  - d) Convection only happens in a vacuum
34. Scattering
- a) changes the wavelength of light
  - b) is responsible for the redness of sunsets
  - c) prevents nearly half of incoming solar radiation from reaching the surface of the earth
  - d) is the primary mechanism of heat transfer in the atmosphere
  - e) all of these
35. Which of the following gasses is the best absorber of ultraviolet light?
- a) water vapor
  - b) nitrogen dioxide
  - c) carbon monoxide
  - d) carbon dioxide
  - e) oxygen

**TRUE/FALSE**

36. Visible light comprises less than half of the total solar energy.
37. Although electromagnetic radiation is described with a variety of names and wavelengths, it is all fundamentally similar.
38. The inclination of the earth's axis is 0° on the equinox dates.

39. A change in the temperature of an object signifies that its heat (or energy) content is stable.
40. The most important atmospheric gas which causes the greenhouse effect for the earth is water vapor.
41. Deserts experience cool nighttime temperatures because of a weaker greenhouse effect.
42. The earth's rotational motion and its orbital motion about the sun are independent from each other.
43. Fairbanks, Alaska, has more hours of daylight in June than Miami, Florida.
44. Meteorologically, conduction is the most important mechanism of heat transfer.
45. Snow-covered surfaces have a low albedo.
46. The atmosphere is heated chiefly by reradiation from the earth's surface.
47. More solar energy is reflected back to space than is absorbed directly by the atmosphere.
48. Seasonal temperature variations are due primarily to the changing distance between the earth and sun.
49. The equator receives vertical rays from the sun year 'round.
50. In Australia, the summer solstice occurs a few days before Christmas.
51. When an object absorbs radiant energy, its temperature increases.
52. As an object cools, the wavelengths of its maximum radiation shorten.
53. Like the earth, the moon also has a blue sky.
54. The atmosphere of Venus is composed primarily of carbon dioxide.

#### FILL-IN-THE-BLANK

55. The blue color of the sky is due to \_\_\_\_\_ of light.

End of Pre Test

#### ANSWER KEY FOR TEST

	14. a	28. d	42. True
1. b	15. b	29. b	43. True
2. c	16. c	30. a	44. False
3. b	17. d	31. (a)	45. F
4. b	18. d	32. (d)	46. True
5. d	19. e	33. (b)	47. True
6. c	20. a	34. (b)	48. False
7. a	21. e	35. (e)	49. False
8. c	22. c	36. T	50. True
9. d	23. d	37. True	51. True
10. a	24. b	38. F	52. False
11. b	25. a	39. False	53. False
12. a	26. c	40. True	54. True
13. e	27. b	41. True	55. scattering