Essentials of Meteorology 8th edition Ahrens Test Bank

SKU: 9781305628458-TEST-BANK

TRUE/FALSE

1 : The formation of ice releases heat and warms the surroundings.
A : true
B : false

Correct Answer : A

2 : All things with a temperature above absolute zero emit energy no matter how big or small.
A : true
B : false

Correct Answer : A

3 : When an object emits and absorbs energy at equal rates, its temperature increases.
A : true
B : false

Correct Answer : B

4 : The Southern Hemisphere has warmer summers and colder winters than the Northern Hemisphere.
A : true
B : false

Correct Answer : B

5 : Airline routes are sometimes changed as a result of solar storms.
A : true
B : false

Correct Answer : A

SHORT RESPONSE

6 : Instructions: Choose one answer from each pair of selections.If you could somehow see the random motions of atoms and molecules in air, would they all be moving at the SAME or at DIFFERENT speeds?

Correct Answer : DIFFERENT

7 : Instructions: Choose one answer from each pair of selections.The average speed of atoms in a molecule is a measure of its DENSITY | TEMPERATURE.

Correct Answer : TEMPERATURE

8 : Instructions: Choose one answer from each pair of selections.The longest wavelengths of visible light correspond to the color RED | VIOLET.

Correct Answer : RED

9 : Instructions: Choose one answer from each pair of selections.At a UV index of 10, a person should take EXTRA | MODERATE precautions when exposed to sunlight.

Correct Answer : EXTRA

10 : Instructions: Choose one answer from each pair of selections.Overcast skies usually result in cooler daytime temperatures because clouds are good REFLECTORS | ABSORBERS of sunlight.

Correct Answer : REFLECTORS

11 : Instructions: Choose one answer from each pair of selections.Earths atmosphere SELECTIVELY | CONTINUOUSLY absorbs radiation.

Correct Answer : SELECTIVELY

12 : Instructions: Choose one answer from each pair of selections.Which is a better reflector of solar energy, WATER or ICE?

Correct Answer : ICE

13 : Instructions: Choose one answer from each pair of selections.To see the aurora australis, you have to travel to the NORTHERN | SOUTHERN Hemisphere.

Correct Answer : SOUTHERN

14 : Instructions: Choose one answer from each pair of selections.Compared to Phoenix (30°N latitude), Minneapolis (45°N) will have shorter days in the winter and LONGER | SHORTER days in the summer.

Correct Answer : LONGER

15 : Instructions: Choose one answer from each pair of selections.In the middle latitudes of the Northern Hemisphere, the suns position can affect vegetation. You would expect a SOUTH- | NORTH-facing hill to receive more sunlight during a year.

Correct Answer : SOUTH

16 : What provides a measure of the average speed or kinetic energy of the atoms and molecules in air?

Correct Answer : temperature

17 : Which heat transfer mechanism describes the flow of energy from warmer to colder regions?

Correct Answer : conduction

18 : In some situations, light behaves as if it were composed of particles rather than having a wavelike nature. What is the name given to light particles?

Correct Answer : photons

19 : Which atmospheric gas is responsible for the largest percentage of the greenhouse effect?

Correct Answer : water vapor

20 : During cloud droplet formation, condensation causes the release of what kind of heat into the environment?

Correct Answer : latent

MULTIPLE CHOICE

21 : Which characteristic of air provides a measure of the average speed of the atoms and molecules?
A : pressure
B : temperature
C : density
D : evaporation

Correct Answer : B

22 : The freezing of pure water is 32° on the ____ scale.
A : Kelvin
B : Fahrenheit
C : Celsius
D : absolute

Correct Answer : B

23 : The transfer of heat from molecule to molecule within a substance is called ____.
A : conduction
B : convection
C : radiation
D : latent energy

Correct Answer : A

24 : The heat energy released when water vapor changes to a liquid is called the latent heat of ____.
A : evaporation
B : sublimation
C : vaporization
D : condensation

Correct Answer : D

25 : The energy of motion is known as ____.
A : kinetic energy
B : potential energy
C : radiant energy
D : specific heat

Correct Answer : A

26 : What is responsible for the cold feeling that you experience after leaving a swimming pool on a hot, dry summer day?
A : heat transport by conduction
B : heat transport by convection
C : heat transport by radiation
D : heat transport by latent heat

Correct Answer : D

27 : The movement of smoke in the atmosphere from one area to another by wind is an example of ____.
A : advection
B : radiation
C : conduction
D : reflection

Correct Answer : A

28 : In the lower atmosphere, any air that rises will ____ and cool.
A : expand
B : evaporate
C : compress
D : vaporize

Correct Answer : A

29 : During atmospheric convection, rising air bubbles are called ____.
A : wind
B : vapors
C : thermals
D : clouds

Correct Answer : C

30 : The absolute temperature scale that contains no negative numbers is the ____, which makes it convenient for scientific computing.
A : Fahrenheit
B : Celsius
C : Kelvin
D : Convection

Correct Answer : C

31 : Radiation is made of discrete packets of energy called ____.
A : thermals
B : convective cells
C : photons
D : microns

Correct Answer : C

32 : The wavelength of radiation is ____ proportional to the energy carried per wave.
A : directly
B : not
C : slightly
D : inversely

Correct Answer : D

33 : Which region of the suns electromagnetic spectrum is most responsible for human skin cancer?
A : infrared
B : ultraviolet
C : visible
D : near infrared

Correct Answer : B

34 : Energy transferred by electromagnetic waves is called ____.
A : magnetism
B : convection
C : conduction
D : radiation

Correct Answer : D

35 : The longest wavelength of the electromagnetic spectrum corresponds to the color ____.
A : blue
B : violet
C : red
D : yellow

Correct Answer : C

36 : Electromagnetic radiation with wavelengths between 0.4 and 0.7 micrometers is called ____.
A : ultraviolet light
B : visible light
C : infrared light
D : microwaves

Correct Answer : B

37 : Earths radiation is often referred to as ____ radiation, while the suns radiation is often referred to as ____ radiation.
A : shortwave; longwave
B : shortwave; shortwave
C : longwave; shortwave
D : longwave; longwave

Correct Answer : C

38 : Earth emits radiation with greatest intensity at ____ wavelengths.
A : infrared

B : radio
C : visible
D : ultraviolet

Correct Answer : A

39 : The wavelengths of radiation that an object emits depend primarily on the objects ____.
A : temperature
B : photons
C : density
D : reflective surfaces

Correct Answer : A

40 : As the temperature of an object ____, the intensity of the radiation emitted by the object ____.
A : increases; increases
B : increases; decreases
C : decreases; stays the same
D : decreases; increases

Correct Answer : A

41 : The atmospheric greenhouse effect is due primarily to the fact that ___.
A : oxygen and ozone absorb ultraviolet radiation
B : nitrogen and oxygen transmit visible radiation
C : cloud formation releases latent heat energy
D : carbon dioxide and water vapor absorb infrared radiation

Correct Answer : D

42 : Without the atmospheric greenhouse effect, the average surface temperature of Earth would be ___.
A : higher than at present
B : lower than at present
C : the same as it is now
D : much more variable than it is now

Correct Answer : B

43 : An object at radiative equilibrium temperature is behaving as a ____.
A : selective absorber
B : blackbody
C : light reflector
D : greenhouse gas

Correct Answer : B

44 : Earth emits infrared radiation ____.
A : only at night
B : only during the day
C : at variable times
D : continuously

Correct Answer : D

45 : Which structure or substance has a higher albedo than thin clouds?
A : the moon
B : snow
C : ice
D : water

Correct Answer : B

46 : Although water vapor accounts for about 60% of the atmospheric greenhouse effect, it is the increase of ____ in the atmosphere that appears to be the main cause of global warming.
A : carbon monoxide
B : ozone
C : carbon dioxide
D : argon

Correct Answer : C

47 : The albedo of Earths surface is only about 4%, yet the combined albedo of Earth and its atmosphere is about 30%. Which set of conditions below best explains why this is so?
A : high albedo of clouds; low albedo of water
B : high albedo of clouds; high albedo of water
C : low albedo of clouds; low albedo of water
D : low albedo of clouds; high albedo of water

Correct Answer : A

48 : Earths surface receives about twice as much energy from the atmosphere than from the sun as a result of ____.
A : the release of latent heat during condensation
B : conduction of heat upward from the surface
C : convection
D : absorbed infrared energy radiated back to Earth
E : direct absorption of sunlight by the atmosphere

Correct Answer : D

49 : Which process accounts for the skys blue color?
A : light reflection
B : light scattering
C : albedo
D : thermal convection

Correct Answer : B

50 : An object that radiates more energy than it absorbs will ____.
A : become colder
B : become warmer
C : maintain the same temperature
D : reach radiative equilibrium

Correct Answer : A

51 : During the summer months at the North Pole, the sun does not set for ____.
A : 2 months
B : 24 hours
C : 6 months
D : 4 months

Correct Answer : C

52 : The auroras are caused by charged particles originating from ____.
A : Earths atmosphere
B : solar wind
C : the North Pole
D : the South Pole

Correct Answer : B

53 : Earth is closest to the sun in ____.
A : January
B : March
C : July
D : September

Correct Answer : A

54 : Seasons on Earth are regulated by ___.
A : only the length of daylight hours
B : both the length of daylight hours and the angle sunlight strikes Earths surface
C : only the angle sunlight strikes Earths surface
D : only Earths nearness to the sun

Correct Answer : B

55 : After the winter solstice at middle latitudes in the Northern Hemisphere, the length of the day experiencing daylight ____.
A : increases
B : decreases
C : does not change
D : is exactly 12 hours long

Correct Answer : A

56 : On which date are the suns rays closest to perpendicular to Earths surface in the middle latitudes of the Northern Hemisphere?
A : March 21
B : June 21
C : September 22
D : July 21

Correct Answer : B

57 : The average summer temperatures in the Southern Hemisphere are cooler than the

average summer temperatures in the Northern Hemisphere because ____.
A : Earth is closer to the sun in January
B : Earth is farther from the sun in July
C : over 80% of the Southern Hemisphere is covered with water
D : the suns energy is less intense in the Southern Hemisphere

Correct Answer : C

58 : In the middle latitudes of the Northern Hemisphere, the day with the shortest number of daylight hours occurs on ____.
A : June 21
B : December 21
C : September 22
D : January 1

Correct Answer : B

59 : When it is January and winter in the Northern Hemisphere, it is ____ in the Southern Hemisphere.
A : January and summer
B : January and winter
C : July and winter
D : July and summer

Correct Answer : A

60 : For maximum winter warmth in the Northern Hemisphere, large windows in a house should face ____.
A : north
B : south
C : east
D : west

Correct Answer : B

MATCHING

61 : Match each item with the appropriate description.

A :	A : the horizontal transfer of any atmospheric property by wind
B : convection	B : the transfer of heat from molecule to molecule within a substance
C : advection	C : when a substance inhibits the passage of outgoing radiation
D : reflection	D : the transfer of heat by the mass movement of a fluid, such as water and air
E : absorption	E : when sunlight enters Earth and more light is sent backward

Correct Answer :
A : B

B : D

C : A

D : E

E : C

ESSAY

62 : Using the concept of latent heat, explain why perspiration is an effective way of reducing a persons body temperature.

Correct Answer : The process of a phase change, such as the evaporation of perspiration from the skin, requires the exchange of energy known as latent heat. As molecules of water escape, or evaporate, from the skin, energy is taken from the environment. During evaporation, the more energetic, faster-moving molecules escape most easily and the average motion of all the molecules left behind decreases as each additional molecule evaporates. Since temperature is a measure of average molecular motion, the slower motion suggests a lower water temperature. Therefore, evaporation is a cooling process because the energy needed to change the water's phase from liquid to a gas is taken from the environment.

63 : Does the expansion of air cause its temperature to increase or decrease? Why?

Correct Answer : Expansion decreases the temperature of air. As air rises in the atmosphere the surrounding air pressure decreases allowing for the air to expand. Because there is no other energy source, the air molecules use their own energy to spread out. This energy loss causes a reduction in molecular speed and, therefore, air temperature as well.

64 : In the discussion of Earths annual energy balance, we saw that Earth absorbed approximately 51 units of solar energy but emitted 117 units of infrared energy. What prevents Earth from getting colder and colder?

Correct Answer : Only a fraction of the emitted energy passes through into space. The majority of the energy is absorbed in the atmosphere mainly by greenhouse gases (primarily water vapor and carbon dioxide) and clouds. Much of this absorbed energy is then radiated back to Earth, producing the atmospheric greenhouse effect and, therefore, preventing the cooling of the Earth.

65 : If the amount of snow and ice in the polar regions of Earth were to decline due to global warming, how would you expect this to affect the radiation budget of Earth?

Correct Answer : The percent of radiation reflected from a given surface is the albedo. Snow has one of the highest albedo percentages, in that up to 95% of sunlight may be reflected from the snow surface. If total snow cover on Earth is reduced, the energy that would have been reflected becomes absorbed instead. Increased polar snow and ice melt will result in higher sea levels, which coupled with rising ocean temperatures will cause an increase in evaporation rates that will add more water vapor (a greenhouse gas) to the atmosphere and, subsequently, increase the amount of radiation returned to Earth.

66 : Explain why sunrises and sunsets typically have colors of red, orange, and yellow.

Correct Answer : Solar radiation entering Earth’s atmosphere is scattered as it strikes air molecules and dust particles. Because air molecules are much smaller than the wavelengths of visible light, they more effectively scatter the shorter (blue) wavelengths than the longer (red) wavelengths. At sunrise and sunset, the sun is (typically) located on the horizon and sunlight must travel a longer distance through a thicker portion of the atmosphere. As sunlight travels along this path, the shorter wavelengths of visible light are more effectively scattered by the atmospheric air particles and the longer wavelengths of red, orange, and yellow are allowed to pass through, thereby creating the image of a red/orange sun.