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Understanding Weather and Climate, 6e (Aguado)
Chapter 2 Solar Radiation and the Seasons

1) Power is:

- A) the same as energy.
- B) the rate at which energy is released.
- C) measured in joules.
- D) the ability to do work.

Answer: B

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

2) This method of energy transfer does not involve the net movement of particles or waves in the direction of energy transfer:

- A) conduction.
- B) convection.
- C) radiation.
- D) All three of the above involve the movement of particles.

Answer: A

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

3) Convection:

- A) does not involve an actual transfer of energy.
- B) involves potential energy only.
- C) involves mixing in a fluid.
- D) is another term for conduction.

Answer: C

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

4) Radiation:

- A) is more like conduction than like convection.
- B) supplies only a minute portion of the earth's energy.
- C) cannot be thought of as consisting of particles.
- D) can be transferred through a vacuum.

Answer: D

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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5) Energy:

- A) occurs at only one scale.
- B) occurs at more than one scale.
- C) occurs only at scales that are very small.
- D) occurs only at scales that are very large.

Answer: B

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

6) Energy transfer processes include:

- A) only those processes that can be seen.
- B) energy that is transferred at the molecular level only.
- C) conduction, convection, and radiation.
- D) only the energy interactions between the earth and the atmosphere.

Answer: C

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

7) Energy is traditionally defined as the ability to:

- A) do work.
- B) create movement.
- C) cause acceleration.
- D) none of the above

Answer: A

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

8) About one part in _____ of the Sun's total energy is transferred to Earth.

- A) one hundred
- B) one million
- C) one billion
- D) two billion

Answer: D

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

9) The standard unit of energy in the International System (SI) used in scientific applications is the:

- A) Watt.
- B) Ampere.
- C) Joule.
- D) Ohm.

Answer: C

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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10) An electron orbiting a hydrogen atom:

- A) is restricted to a single energy state.
- B) cannot be removed from that atom unless that atom combines with another hydrogen atom to form a hydrogen molecule.
- C) has greater energy when it is further away from the nucleus.
- D) can absorb and emit photons of nearly any wavelength.

Answer: C

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

11) The relationship between kinetic energy and potential energy is:

- A) one must have potential energy before kinetic energy can be realized.
- B) kinetic energy is proportional to the potential energy.
- C) potential energy is the storage state of kinetic energy.
- D) in practice, all of a potential energy source is never fully transformed to usable kinetic energy.
- E) All of the above are true.

Answer: E

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

12) Radiation, as an energy transfer mechanism, is especially important because:

- A) radiation energy can travel without an intervening medium.
- B) everything radiates.
- C) radiation provides us with visible light.
- D) all of the above

Answer: D

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

13) This is a form of kinetic energy:

- A) a charged battery not in use.
- B) firewood.
- C) water behind a dam.
- D) electrical power.

Answer: D

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge; Comprehension; Application

Glob Sci Outcome: G1; G2; G7

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14) This is a form of potential energy:

- A) electromagnetic radiation.
- B) boiling water.
- C) food.
- D) a water wheel in motion.

Answer: C

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge; Comprehension; Application

Glob Sci Outcome: G1; G2; G7

15) The measurement used to specify wavelengths is called the:

- A) micrometer.
- B) macrometer.
- C) nanometer.
- D) decameter.

Answer: A

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

16) Black bodies:

- A) can only approximate the Stefan-Boltzmann law.
- B) are hypothetical; they don't actually exist.
- C) emit the same amount of energy regardless of their temperatures.
- D) do not emit radiation as well as gray bodies do.

Answer: B

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

17) The Stefan-Boltzmann law:

- A) gives energy intensities in watts per square meter.
- B) demonstrates that a cooler body will radiate with greater intensity than will a hotter body.
- C) does not apply to black bodies.
- D) is derived from Wien's law.

Answer: A

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

18) Emissivity:

- A) can have values greater than one.
- B) will always be less than one for any object that is not a black body.
- C) is typically .1 or below for most natural surfaces encountered on Earth.
- D) is constant for the atmosphere.

Answer: B

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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19) The largest energy transfer in the solar spectrum occurs in the:

- A) x-ray part of the spectrum.
- B) ultraviolet part of the spectrum.
- C) visible part of the spectrum.
- D) infrared part of the spectrum.
- E) radio wave part of the spectrum.

Answer: C

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

20) Bodies that emit some percentage of the maximum amount of radiation possible at a given temperature are called:

- A) blackbodies.
- B) black holes.
- C) graybodies.
- D) partials.

Answer: C

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

21) At the speed of light, energy from the sun takes how much time to reach the Earth?

- A) 1 second
- B) 30 seconds
- C) 8 minutes
- D) 24 minutes

Answer: C

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

22) The single factor that determines how much energy a blackbody radiates is its:

- A) temperature.
- B) mass.
- C) volume.
- D) density.

Answer: A

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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23) The single factor that determines how much energy a blackbody radiates is its:

- A) size.
- B) distance.
- C) diameter.
- D) temperature.

Answer: D

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

24) Which of the following orbit the nuclei of the atom in "shells"?

- A) protons
- B) photons
- C) electrons
- D) neutrons

Answer: C

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

25) Electromagnetic radiation:

- A) consists of waves that can vary in amplitude.
- B) is relatively rare in the universe.
- C) consists of two waves that are 90 degrees out of phase with each other.
- D) does not create an electric field.

Answer: A

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

26) All of the following are true statements about electromagnetic radiation, except:

- A) it moves at the speed of light.
- B) it is often measured in micrometers.
- C) its energy is inversely proportional to its amplitude.
- D) its energy does not decrease with distance.

Answer: C

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

27) The visible light spectrum is bounded by these two types of radiation:

- A) x-ray and thermal infrared.
- B) x-ray and radio wave.
- C) microwave and gamma ray.
- D) ultraviolet and near infrared.

Answer: D

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1

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28) According to Wien's law:

- A) the wavelength of peak radiation is proportional to the amount of radiation.
- B) the Sun's energy intensity peaks in the visible portion of the electromagnetic spectrum.
- C) the radiation emitted from Earth must be 4 micrometers or longer.
- D) wavelength is proportional to the fourth power of the intensity of radiation.

Answer: B

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2; G4

29) The Stefan-Boltzmann Law gives the relationship between:

- A) solar energy and temperature.
- B) temperature and long-wave radiation.
- C) the intensity of radiation and the temperature of an object.
- D) emissivity and wavelength.

Answer: C

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2; G4

30) Electromagnetic radiation provides energy for:

- A) the movement of the atmosphere.
- B) the growth of plants.
- C) the evaporation of water.
- D) all of the above

Answer: D

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

31) The peak of the Earth's emission is _____, while the sun's peak is 0.5 microns.

- A) 0.1 microns
- B) 1 micron
- C) 10 microns
- D) 100 microns

Answer: C

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

32) _____ radiation is used to cook food and _____ radiation causes sunburn.

- A) Infrared; ultraviolet
- B) Microwave; ultraviolet
- C) X-ray; infrared
- D) Ultraviolet; infrared

Answer: B

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

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33) Differences in emissivity of a substance are governed by differences in:

- A) moisture.
- B) pressure.
- C) temperature.
- D) wind speed.

Answer: C

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2

34) Which of the following has the longest wavelength?

- A) thermal infrared
- B) radio
- C) gamma
- D) ultraviolet

Answer: B

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2; G4

35) If object A is at 400 K, and object B is at 800 K, then the radiation intensity of object A will be this amount of that the radiation intensity of object B:

- A) one-half.
- B) one-fourth.
- C) one-eighth.
- D) one-sixteenth.

Answer: D

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension; Analysis; Application

Glob Sci Outcome: G1; G2; G3; G4

36) Choose the correct listing of radiation from the longest wavelengths to the shortest wavelengths:

- A) radio, gamma rays, ultraviolet, visible, infrared, x-rays.
- B) gamma rays, radio, ultraviolet, infrared, visible, x-rays.
- C) x-rays, ultraviolet, infrared, gamma rays, visible, radio.
- D) radio, infrared, visible, ultraviolet, x-rays, gamma rays.

Answer: D

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension; Analysis; Evaluation

Glob Sci Outcome: G1; G2; G3

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37) How long does it take for energy generated near the core of the sun by fusion to reach the Earth-atmosphere system as solar radiation?

- A) immediately
- B) 8 minutes
- C) 1 century
- D) 1 million years

Answer: D

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

38) Sunspots:

- A) are caused by locally intense magnetic fields.
- B) appear in the chromosphere.
- C) are warmer than the material surrounding them.
- D) tend to be less than 100 miles in diameter.

Answer: A

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

39) Sunspot activity:

- A) typically varies in number on a roughly eleven-year cycle.
- B) was first observed in the late nineteenth century.
- C) typically has the same number of sunspots per year.
- D) has been conclusively linked to climate changes.

Answer: A

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

40) Sunspot numbers were lowest in this century:

- A) seventeenth century.
- B) eighteenth century.
- C) nineteenth century.
- D) twentieth century.

Answer: A

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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41) In the innermost portion of the Sun, the core, extremely high temperatures and high densities lead to the energy-creating process of:

- A) nuclear fission.
- B) nuclear fusion.
- C) the big bang.
- D) nuclear differentiation.

Answer: B

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

42) Sunspots are associated with the solar:

- A) core.
- B) corona.
- C) photosphere.
- D) chromosphere.

Answer: C

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

43) Energy created by the sun travels from the:

- A) core.
- B) corona.
- C) photosphere.
- D) chromosphere.

Answer: A

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

44) Temperatures within these features can reach 100 million degrees Kelvin:

- A) granules.
- B) flares.
- C) sunspots.
- D) the solar wind.

Answer: B

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

45) Which of these features are likely to have the highest solar temperatures?

- A) sunspots
- B) solar flares
- C) chromosphere
- D) core

Answer: B

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

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46) The Sun's photosphere:

- A) receives the energy from the Sun's core in a matter of minutes.
- B) radiates much of the energy the earth receives.
- C) decreases in density closer to the Sun's core.
- D) lies above the chromosphere.

Answer: B

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

47) The Sun's photosphere:

- A) lies above the Sun's core.
- B) lies above the Sun's atmosphere.
- C) cannot be viewed by Earth-based observers.
- D) affects the earth's hydrosphere.

Answer: D

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

48) The solar constant:

- A) is the same throughout the solar system.
- B) varies inversely with the fourth power of an object's distance from the Sun's surface.
- C) is independent of the Stefan-Boltzmann law.
- D) is higher for Earth than for Mars.

Answer: D

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2; G4; G7

49) The Northern Hemisphere has its maximum tilt toward the Sun on the:

- A) December solstice.
- B) March equinox.
- C) September equinox.
- D) June solstice.

Answer: D

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

50) The Tropic of Capricorn is directly under the Sun during the:

- A) December solstice.
- B) June solstice.
- C) March equinox.
- D) September equinox.

Answer: A

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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51) The Antarctic Circle has 24 hours of daylight on the:

- A) March equinox.
- B) June solstice.
- C) September equinox.
- D) December solstice.

Answer: D

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

52) The Earth is actually the farthest from the sun on:

- A) January 3rd.
- B) April 1st.
- C) July 4th.
- D) December 25th.

Answer: C

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

53) Incoming solar radiation is often referred to as:

- A) conduction.
- B) diffused radiation.
- C) insolation.
- D) albedo.

Answer: C

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

54) At which point during the year can we have 24 hours of daylight and 1 day of 24 of darkness in the northern hemisphere?

- A) Arctic Circle
- B) North Pole
- C) Antarctic Circle
- D) Tropic of Capricorn

Answer: A

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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55) Which of the following statements about Earth is not true?

- A) It has an elliptical orbit.
- B) Its rotational axis is pointed toward Polaris.
- C) It is closest to the Sun in July.
- D) It is closest to the Sun at perihelion.

Answer: C

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

56) The earth's axis of rotation is tilted roughly this number of degrees away from a line perpendicular to the plane of the earth's orbit:

- A) 5.3.
- B) 11.2.
- C) 23.5.
- D) 90.

Answer: C

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

57) If the earth's axis were parallel with its orbital plane around the Sun:

- A) there would be no significant weather.
- B) the South Pole would always be in darkness.
- C) the North Pole would always be in darkness.
- D) there would be at least one day a year when every spot on Earth would receive 12 hours of daylight.

Answer: D

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

58) The subsolar point:

- A) never moves more than 23.5 degrees in a year.
- B) is at the Tropic of Cancer on the June solstice.
- C) reaches above the Arctic Circle only in summer.
- D) is independent of the solar declination.

Answer: B

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

59) The solar angle:

- A) is the same at the Arctic Circle and at the equator on the solstices.
- B) affects the degree of beam spreading.
- C) is lowest in the Northern Hemisphere during its winter.
- D) is lowest at the North Pole during its summer.

Answer: B

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

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60) On the June solstice:

- A) the solar declination is 23.5 degrees North.
- B) the Southern Hemisphere overall receives more energy than does the Northern Hemisphere.
- C) the South Pole experiences 24 hours of daylight.
- D) the subsolar point is on the Tropic of Capricorn.

Answer: A

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

61) All of the following about equinoxes is true, except:

- A) the solar declination is zero degrees.
- B) both hemispheres receive the same amount of insolation.
- C) every place has 12 hours of daylight.
- D) the solar angle at the North Pole is 90 degrees.

Answer: D

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

62) The solar declination angle:

- A) changes daily.
- B) moves from north to south and back again.
- C) has a northern most and southern most limit of 23.5 degrees.
- D) all of the above

Answer: D

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

63) Which of these cities is likely to see its coldest temperatures in July?

- A) London, England
- B) New York, New York
- C) Buenos Aires, Argentina
- D) Moscow, Russia

Answer: C

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2; G7

64) The greatest seasonal change in the period of daylight is experienced at the:

- A) Equator.
- B) Tropic of Capricorn.
- C) North and South Poles.
- D) Tropic of Cancer.

Answer: C

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2

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65) On which of the following holidays is Earth closest to the Sun?

- A) New Year's Day
- B) Fourth of July
- C) Thanksgiving
- D) Labor Day

Answer: A

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2; G5

66) Most, but not all, of the earth's energy comes from the Sun.

Answer: TRUE

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

67) A raindrop falling from a cloud is an example of kinetic energy changing into potential energy.

Answer: FALSE

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

68) A solid object at rest is still moving internally.

Answer: TRUE

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2

69) The energy it takes for you to write the answer to this question ultimately comes from the Sun.

Answer: TRUE

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2

70) Radiation consists of both an electric wave and a magnetic wave.

Answer: TRUE

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

71) According to the Stefan-Boltzmann law, there are three factors that determine how much energy an object will radiate.

Answer: FALSE

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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72) The emissivity of a black body is one.

Answer: TRUE

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

73) The concept of emissivity is especially useful when applied to the atmosphere.

Answer: FALSE

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

74) The amount of energy a wave carries is inversely proportional to the wave's amplitude.

Answer: FALSE

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2; G4

75) According to astronomers, the Sun is different from most other stars in our galaxy.

Answer: FALSE

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

76) Granules are the result of convective energy transfer within the Sun.

Answer: TRUE

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

77) The orientation of the earth's rotational axis has little effect on either climate or weather.

Answer: FALSE

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

78) The subsolar point is confined between the Tropic of Cancer and the Tropic of Capricorn.

Answer: TRUE

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

79) The period of daylight at the Equator is the same every day of the year.

Answer: TRUE

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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80) It is possible on a given day for a location with a smaller solar angle to receive more total radiation than a location with a larger solar angle.

Answer: TRUE

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Analysis; Synthesis

Glob Sci Outcome: G1; G2

81) There is always more daylight in the Northern hemisphere on a solstice than on an equinox.

Answer: FALSE

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Application

Glob Sci Outcome: G1; G2

82) Beam depletion is at maximum at noon.

Answer: FALSE

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Application

Glob Sci Outcome: G1; G2

83) Heat transfer through fluid mixing is called _____.

Answer: convection

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

84) Nearly all of the energy available on Earth comes from the _____.

Answer: Sun

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

85) List three forms of kinetic energy and five forms of potential energy.

Answer:

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

86) Describe the three processes of energy transfer.

Answer:

Section: 2.1 Energy

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

87) A _____ is a perfect emitter of radiation.

Answer: blackbody

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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88) The earth's radiation is strongest in this portion of the spectrum, the _____.

Answer: longwave (or infrared) portion
Section: 2.2 Characteristics of Radiation
Bloom's Taxonomy: Knowledge
Glob Sci Outcome: G1

89) The solar constant is measured in _____.

Answer: watts per square meter
Section: 2.2 Characteristics of Radiation
Bloom's Taxonomy: Knowledge
Glob Sci Outcome: G1

90) Define and discuss the following terms involving radiation: electric wave, magnetic wave, wavelength, wave amplitude, wave speed, black body, Stefan-Boltzmann law, Wien's law, electromagnetic bands.

Answer:
Section: 2.2 Characteristics of Radiation
Bloom's Taxonomy: Knowledge; Comprehension; Analysis
Glob Sci Outcome: G1; G2

91) Discuss the various factors which affect the absorption and emission of photons by a hydrogen atom.

Answer:
Section: 2.2 Characteristics of Radiation
Bloom's Taxonomy: Knowledge; Comprehension; Analysis
Glob Sci Outcome: G1; G2

92) Describe the sections of the Sun and the important activities that happen in each.

Answer:
Section: 2.2 Characteristics of Radiation
Bloom's Taxonomy: Knowledge; Comprehension; Analysis
Glob Sci Outcome: G1; G2

93) Why is it not completely accurate to describe the energy coming from the Sun as visible radiation?

Answer: Although the peak emission of solar radiation is in the visible portion of the spectrum, the Sun emits radiation across the full range of the spectrum from gamma rays to radio waves.
Section: 2.2 Characteristics of Radiation
Bloom's Taxonomy: Knowledge; Comprehension; Analysis; Application
Glob Sci Outcome: G1; G2; G7

94) Describe how Wien's law has been applied to the understanding of satellite images that you see on television weather broadcasts.

Answer: The color enhanced satellite images depict the height of cloud tops, which can be used as an indicator of the intensity of precipitation. The images are obtained by measuring the intensity of IR radiation emitted by the cloud tops. Colder surfaces radiate less energy than do warmer objects. Higher clouds tend to be colder than lower level clouds because the temperature in the troposphere decreases with height. The colder cloud tops imply thicker clouds and therefore identify areas with significant weather.
Section: 2.2 Characteristics of Radiation
Bloom's Taxonomy: Knowledge; Comprehension; Analysis; Application; Synthesis
Glob Sci Outcome: G1; G2; G5; G7

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95) Explain why ultraviolet (UV) radiation causes sunburn and infrared (IR) radiation does not.

Answer: The amount of energy delivered is determined by wavelength; shorter wavelengths are more energetic. Ultraviolet radiation is associated with shorter wavelengths and can deliver more energy to exposed skin than can infrared radiation.

Section: 2.2 Characteristics of Radiation

Bloom's Taxonomy: Knowledge; Comprehension; Application

Glob Sci Outcome: G1; G2; G5

96) _____ have a fairly regular period of maxima, but the maxima themselves can vary significantly.

Answer: Sunspots

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

97) The _____ is the upper part of the Sun's atmosphere.

Answer: corona

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

98) Explain why the solar "constant" actually varies over time.

Answer: The Sun "flickers" as it burns, so very small variations in solar output occur.

Section: 2.3 The Solar Constant

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

99) Define beam depletion.

Answer:

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

100) Day and night have an equal length during a(n) _____.

Answer: equinox

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

101) At the December solstice, the subsolar point is on the _____.

Answer: Tropic of Capricorn

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

102) On the June solstice, the area poleward of the _____ experiences 24 hours of darkness.

Answer: Antarctic Circle

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

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103) Earth's annual trip around the Sun is called _____.

Answer: revolution

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge

Glob Sci Outcome: G1

104) Explain why it is cold in the Northern Hemisphere when the Earth is closest to the Sun.

Answer: The orientation of the hemisphere with regard to the Sun is the main cause of the seasons, not the varying Earth-Sun distance

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension

Glob Sci Outcome: G1; G2

105) What are the characteristics of the earth's orbit around the Sun and Earth's rotation on its axis?

Answer:

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2

106) Discuss the angle of the Sun and the position of the earth at both equinoxes and both solstices.

Answer:

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2

107) Describe the various ways energy receipt can vary with latitude and time of year.

Answer:

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2

108) What is the difference between beam spreading and beam depletion? Which one is the most important cause of seasonal change?

Answer: Beam depletion is the depth of atmosphere sunlight must penetrate before reaching the surface. Beam spreading is the increase in the surface area over which sunlight is distributed in response to a decrease in solar angle. The beam spreading contributes more to causing Earth's seasons.

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Analysis

Glob Sci Outcome: G1; G2

109) Winnipeg, Canada, is located near latitude 50N and Austin, Texas, is located near 30N, but Winnipeg receives slightly more solar radiation on the June solstice. Explain this apparent paradox.

Answer: The period of daylight at Winnipeg is over two hours longer and this compensates for the lower midday solar angle.

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Analysis; Application

Glob Sci Outcome: G1; G2; G7

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110) Winnipeg, Canada, receives slightly more solar radiation on the June solstice than Austin, Texas; yet summers at Austin are hotter. Explain this apparent paradox.

Answer: Solar radiation is not the only influence on seasonal temperatures; other factors such as clouds, atmospheric conditions, wind, precipitation, and the type of surface all play a role as well.

Section: 2.4 The Causes of Earth's Seasons

Bloom's Taxonomy: Knowledge; Comprehension; Analysis; Application

Glob Sci Outcome: G1; G2; G7

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