Elemental Geosystems, 9e **(Christopherson/Birkeland)**
Chapter 2 Solar Energy to Earth and the Seasons

1) Which of the following is TRUE about our Solar System?
A) It is embedded in the Andromeda Galaxy.
B) It is some 300,000 light-years from the black hole at the center of the Milky Way.
C) It contains the Sun and 8 planets.
D) It is located in the approximate center of the Milky Way Galaxy.
Answer: C
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.2 Sketch Earth's orbital path around the Sun.

2) Which of the following is TRUE about our Solar System?
A) It is embedded in the Andromeda Galaxy.
B) It contains over 100 billion stars.
C) It contains 8 planets.
D) It contains over 200 billion galaxies.
Answer: C
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.2 Sketch Earth's orbital path around the Sun.

3) The hypothesis involving a nebula that collapsed to form a protosun and protoplanets refers to the formation of
A) the universe.
B) our galaxy.
C) our Solar System.
D) the ocean basins.
Answer: C
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
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Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.1 Describe our Solar System.

4) The prevailing hypothesis for the formation of our Solar System is that
A) planets form as a direct result of the nuclear fusion of nebular gases and protoplanets.
B) planets form from the remains of super-giant protoplanets that undergo nuclear fission and blow apart, thereby creating smaller objects—the planets.
C) early in the Solar System's history, a star passed near to the Sun and pulled off gases that eventually condensed to form planets.
D) small grains of cosmic dust and other solids gradually grow together and may grow to become protoplanets and eventually planets.
Answer: D
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.1 Describe our Solar System.

5) Earth and the Sun formed specifically from
A) the galaxy.
B) unknown origins.
C) a nebula of dust and gases.
D) other planets.
Answer: C
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.1 Describe our Solar System.

6) The estimated number of planets in the Milky Way is _____ with some _____ in habitable zones.
A) 300 billion; 125 billion
B) 25 million; 3 million
C) 1 billion; 25 million
D) 50 billion; 500 million
Answer: D
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.1 Describe our Solar System.

7) Our planet and our lives are powered by
A) energy derived from inside Earth.
B) radiant energy from the Sun.
C) utilities and oil companies.
D) shorter wavelengths of gamma rays, X-rays, and ultraviolet.
Answer: B
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

8) Which of the following is TRUE?
A) The Sun is the largest star in the Milky Way Galaxy.
B) The Milky Way is part of our Solar System.
C) The Sun produces energy through fusion processes.
D) The Sun is a planet.
Answer: C
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.1 Describe our Solar System.

9) Which of the following is FALSE?
A) The Sun and Solar System are part of the Milky Way Galaxy.
B) The Sun produces energy through fusion.
C) The Sun is by far the largest star in the Milky Way Galaxy.
D) The Sun is average in temperature, size, and color.
Answer: C
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.1 Describe our Solar System.

10) Light travels at a speed of approximately
A) 80,500 kilometers per hour (50,000 mph).
B) 300,000 kilometers per hour (186,336 mph).
C) 300,000 kilometers per second (186,333 miles per second).
D) 1,000,000,000 kilometers per second (621,118,012 miles per second).
Answer: C
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

11) Which of the following does NOT accurately describe Earth's distance from the Sun?
A) The Earth-Sun distance averages 150 million kilometers (93 million miles).
B) It takes light an average of 8 minutes and 20 seconds to travel from the Sun to Earth.
C) Earth is closer to the Sun in January (perihelion) and farther away in July (aphelion).
D) Earth's orbit around the Sun is presently circular and, therefore Earth is always equidistant from the Sun throughout the year.
Answer: D
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
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Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.2 Sketch Earth's orbital path around the Sun.

12) Which of the following accurately describes Earth's distance from the Sun?
A) The Earth-Sun distance averages 150 million kilometers (93 million miles).
B) It takes light an average of 11 hours to travel from the Sun to Earth.
C) Earth is closer to the Sun in July (perihelion) and farther away in January (aphelion).
D) Earth's orbit around the Sun is presently circular and, therefore Earth is always equidistant from the Sun throughout the year.
Answer: A
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.2 Sketch Earth's orbital path around the Sun.

13) Which of the following is TRUE of Earth's orbit about the Sun?
A) It is perfectly circular.
B) It is elliptical.
C) It takes approximately the same time for Earth as it does the rest of the planets in the Solar System to orbit the Sun.
D) The orbit does not vary over millions of years.
Answer: B
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
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14) When is Earth at perihelion, when it is closest to the Sun?
A) During the Northern Hemisphere's winter
B) During the Northern Hemisphere's summer
C) During the Northern Hemisphere's spring
D) During the Northern Hemisphere's autumn
Answer: A
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
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15) Which of the following is NOT true of sunspots?
A) They can be several times larger than Earth.
B) They can produce flares and prominences.
C) They are brighter than the rest of the Sun's surface.
D) They are surface disturbances caused by magnetic storms.
Answer: C
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

16) A magnetic disturbance on the Sun's surface is called
A) the electromagnetic spectrum.
B) the solar wind.
C) a sunspot.
D) a magnetospheric cyclone.
Answer: C
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
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17) On its way to Earth, the solar wind first encounters
A) the atmosphere.
B) the magnetosphere.
C) Earth's surface.
D) the lower atmosphere.
Answer: B
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
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LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

18) Earth's magnetic field is generated by
A) nuclear fusion in Earth's core.
B) nuclear fission in Earth's core.
C) dynamo-like motions in Earth's interior.
D) gravitational accretion.
Answer: C
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
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19) The auroras in the upper atmosphere are caused by
A) visible light interaction with the asthenosphere.
B) AM radio broadcasts.
C) various weather phenomena.
D) the interaction of the solar wind and upper layers of Earth's atmosphere.
Answer: D
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

20) The Sun gives off electromagnetic radiation because
A) matter is converted into energy.
B) matter and energy totally annihilate one another in matter-antimatter reactions.
C) energy is converted into matter.
D) kinetic energy is converted into potential energy.
Answer: A
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

21) The distance between corresponding points on any two successive waves is known as the
A) wavelength.
B) electromagnetic spectrum.
C) frequency.
D) Kelvin.
Answer: A
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

22) The number of waves passing a fixed point in 1 second is known as the
A) wavelength.
B) electromagnetic spectrum.
C) frequency.
D) Kelvin.
Answer: C
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

23) The Sun produces
A) mainly visible light and infrared energy.
B) mainly ultraviolet and X-rays.
C) only solar wind.
D) only radiant energy that is beneficial to life.
Answer: A
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

24) Radio waves have a _____ wavelength than visible light and are therefore _____ energetic.
A) longer; less
B) longer; more
C) shorter; less
D) shorter; more
Answer: A
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

25) Which of the following is TRUE of the Sun's electromagnetic spectrum?
A) It is only radiant energy made of gamma ray, X-ray, and ultraviolet wavelengths.
B) It is only streams of charged particles.
C) It consists of gamma ray, X-ray, ultraviolet, visible, and infrared wavelengths.
D) It is only visible light and infrared energy.
Answer: C
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

26) Which of the following is TRUE?
A) The Sun emits longwave radiation; Earth emits shortwave radiation.
B) The Sun emits shortwave radiation; Earth emits longwave radiation.
C) The radiation emitted by the Sun and Earth are roughly the same wavelength.
D) Because the Sun is so far away, it is impossible to measure the wavelengths of its radiation.
Answer: B
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

27) The dominant wavelength of energy emitted by the Sun is
A) shorter than that emitted by Earth.
B) longer than that emitted by Earth.
C) the same length as that emitted by Earth.
Answer: A
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

28) Which of the following is characterized by the longest wavelengths?
A) X-rays
B) Gamma rays
C) Visible
D) Thermal infrared
E) Radio waves
Answer: E
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

29) The _____ emits mainly _____ which is also called _____.
A) Sun—longwave radiation—infrared
B) Sun—shortwave radiation—radio waves
C) Earth—longwave radiation—infrared
D) Earth—shortwave radiation—infrared
E) Earth—longwave radiation—ultraviolet
Answer: C
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

30) The dominant wavelength emitted by Earth is
A) gamma radiation.
B) X-ray radiation.
C) visible light.
D) thermal infrared.
Answer: D
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

31) Which of the following sequences is arranged in order from shorter wavelength to longer wavelength?
A) Infrared, visible, ultraviolet, X-rays
B) X-rays, ultraviolet, visible, infrared
C) Gamma rays, microwaves, visible, X-rays
D) Radio waves, light, heat, X-rays
Answer: B
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

32) The thermopause refers to
A) Earth's magnetic field.
B) the solar atmosphere that extends into space.
C) the top of Earth's atmosphere.
D) the Sun's surface.
Answer: C
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

33) Incoming solar radiation is called
A) solar wind.
B) thermosphere.
C) solar constant.
D) insolation.
Answer: D
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

34) The average insolation received by the thermopause when Earth is at its average distance from the Sun is known as the
A) solar constant.
B) solar wind input to the atmosphere.
C) energy balance.
D) incoming solar radiation.
Answer: A
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

35) The solar constant is measured at
A) the Sun's surface.
B) the edge of the Sun's atmosphere.
C) the top of the atmosphere.
D) sea level.
Answer: C
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

36) Which of the following is TRUE of insolation at the top of the atmosphere?
A) Annually, insolation is evenly distributed with little change by latitude.
B) Annually, lower latitudes receive more insolation than the higher latitudes.
C) Annually, higher latitudes receive more insolation than lower latitudes.
D) Insolation can only be measured longitudinally, not latitudinally.
Answer: B
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

37) The uneven distribution of insolation by latitude is mostly because of
A) variability in the Sun's output.
B) the changing distance of Earth from the Sun.
C) variation in the value of a watt.
D) Earth's curvature, which presents varied angles to parallel solar rays.
Answer: D
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

38) What is the name of the location on the surface of Earth that receives insolation when the Sun is directly overhead? (When this occurs, the Sun's rays are perpendicular to this surface.)
A) Solar point
B) Zenith
C) Subsolar point
D) North Polar point
Answer: C
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.5 Define Sun altitude, solar declination, and daylength.

39) Which of the following is TRUE of the subsolar point?
A) The highest latitude at which it occurs is 66.5° N/S.
B) It only occurs at latitudes between the tropics (23.5° N/S).
C) It occurs at all latitudes at least once throughout the year.
D) It never occurs beyond a few degrees of the equator.
Answer: B
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.5 Define Sun altitude, solar declination, and daylength.

40) Which of the following is CORRECT relative to global net radiation?
A) There is a latitudinal energy imbalance, with positive values in the tropics and negative at the poles.
B) Global net radiation is, more or less, equal, at all latitudes.
C) The highest positive net radiation is in midlatitude regions, especially over land.
D) There is a latitudinal energy imbalance, with positive values at the poles and lower in the tropics.
Answer: A
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

41) The term "net radiation" refers to
A) the total amount of energy received by Earth.
B) the total amount of energy radiated by Earth.
C) the difference in amount of incoming and outgoing radiation.
D) radiation emitted by satellite networks.
Answer: C
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

42) The Sun's altitude refers to
A) the angular distance from the equator to the latitude at which direct overhead insolation is received.
B) the angle of the Sun above the horizon.
C) the subsolar point.
D) how far the Sun is from Earth.
Answer: B
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.5 Define Sun altitude, solar declination, and daylength.

43) The Sun's declination refers to
A) the latitude of the subsolar point.
B) the angle of the Sun above the horizon.
C) how far the Sun is from Earth.
D) its altitude, in thousands of feet, above the horizon.
Answer: A
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.5 Define Sun altitude, solar declination, and daylength.

44) The Sun's declination moves a total of _____ of latitude from summer to winter.
A) 23.5°
B) 30°
C) 47°
D) 66.5°
E) 133°
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.5 Define Sun altitude, solar declination, and daylength.

45) Which of the following is CORRECT regarding daylength?
A) Daylength is uniform at all latitudes throughout the year.
B) The equator experiences six hours of difference in daylength between the summer and winter.
C) The equator always receives equal hours of day and night.
D) The difference in daylength between the summer and winter is shortest in the polar regions.
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

46) Which of the following is TRUE of the number of hours of daylight?
A) The number of hours of daylight varies depending on longitude.
B) The number of hours of daylight varies depending on latitude.
C) The number of hours of daylight varies the most along the equator.
D) The number of hours of daylight varies the least at higher latitudes.
Answer: B
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

47) Which of the following is TRUE regarding daylength?
A) The equator experiences at least six hours of difference in daylength from winter to summer.
B) Nowhere on Earth does daylength vary by as much as 24 hours.
C) Daylength varies less at the poles than at the equator.
D) Daylength at the equator is always 12 hours.
Answer: D
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

48) Changes in daylength, the Sun's altitude above the horizon, and the Sun's declination over the course of the year
A) produce Earth's rotation.
B) are phenomena that occur only at the equator.
C) are responsible for the seasons.
D) are factors that follow an irregular, random cycle.
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

49) Which of the following is NOT a reason for the seasons?
A) Earth's axial tilt
B) The revolution of Earth around the Sun
C) The timing of Earth's perihelion and aphelion
D) The shape of Earth
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

50) Which of the following characterizes Earth's revolution?
A) It takes approximately 24 hours.
B) It is responsible for creating the circle of illumination, and hence, day/night relationships.
C) It is clockwise when viewed from above the North Pole.
D) It determines the timing of seasons and length of the year.
Answer: D
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

51) When viewed from the equator, Earth's rotation is described as
A) east to west.
B) north to south.
C) west to east.
D) clockwise.
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

52) At all times during the year, the circle of illumination
A) divides Earth between Northern and Southern Hemispheres.
B) divides Earth into eastern and western halves.
C) separates winter from summer.
D) divides Earth between equal halves of lightness and darkness.
Answer: D
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

53) The plane of Earth's orbit about the Sun is called
A) perihelion.
B) aphelion.
C) the plane of the ecliptic.
D) a great circle.
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

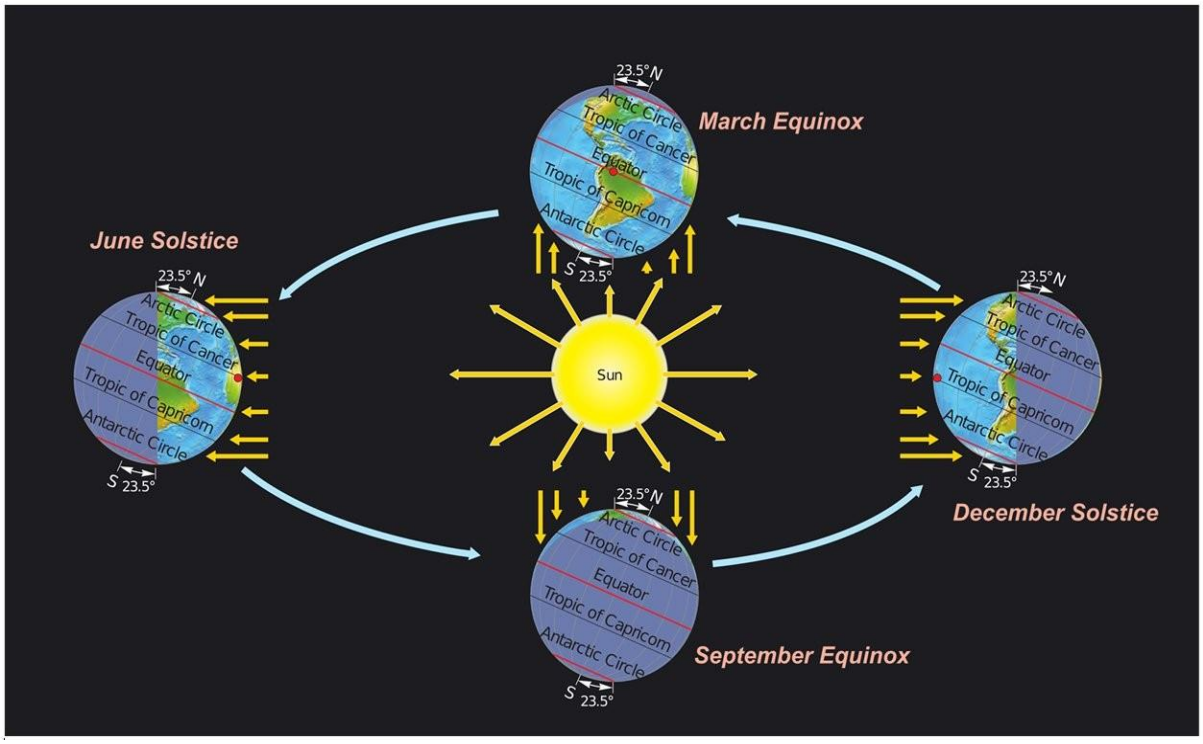
54) Which of the following cannot be attributed to the effects of Earth's rotation?
A) Daylength
B) Deflection of the winds
C) Deflection of the ocean currents
D) Latitudinal variations in net radiation
Answer: D
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

55) Which of the following is NOT true?
A) Earth's axis is tilted 23.5° relative to the plane of the ecliptic.
B) Earth's axis points at Polaris (the North Star).
C) During the winter months, Earth's axis is aligned towards Southern Cross.
D) Throughout the year, Earth's axis maintains the same alignment relative to the plane of the ecliptic and Polaris (the North Star).
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

56) Which of the following is TRUE regarding Earth's axis?
A) The amount of axial tilt fluctuates during the year and forms the basis for seasonal changes.
B) The axis remains parallel to the plane of the ecliptic.
C) Axial tilt is unrelated to the phenomenon of seasonal change.
D) The axis is tilted 23.5° from a perpendicular to the plane of the ecliptic.
Answer: D
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

57) The Southern Hemisphere's summer solstice occurs
A) at the same time as the Northern Hemisphere's summer solstice.
B) on or around June 21.
C) on or around December 21.
D) during the Northern Hemisphere's equinox.
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

58) On the Northern Hemisphere's summer solstice, the north polar region receives _____ daily insolation than areas at the equator because _____.
A) more; the Sun does not set
B) more; the Sun is higher in the sky
C) less; the Sun does not rise
D) less; the Sun is lower in the sky
Answer: A
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.



59) Which of the following is TRUE for the December Solstice?
A) The subsolar point is at the equator.
B) The Arctic Circle is completely within the circle of illumination.
C) The Antarctic Circle is completely within the circle of illumination.
D) The subsolar point is at the Tropic of Cancer (23.5° N).
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

60) Which of the following is TRUE for the June Solstice?
A) The subsolar point is at the equator.
B) The Arctic Circle is completely within the circle of illumination.
C) The Antarctic Circle is completely within the circle of illumination.
D) The subsolar point is at the Tropic of Capricorn (23.5° S).
Answer: B
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

61) Which of the following is TRUE for the March Equinox?
A) The subsolar point is at the equator.
B) The subsolar point is at the Tropic of Cancer (23.5° N).
C) The subsolar point is at the Tropic of Capricorn (23.5° S).
D) The subsolar point is at the Prime Meridian.
Answer: A
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

62) Which of the following is TRUE for the September Equinox?
A) There is 24 hours of daylight at the North Pole.
B) The Arctic Circle is completely within the circle of illumination.
C) The Antarctic Circle is completely within the circle of illumination.
D) The circle of illumination passes through both the poles.
E) There is 24 hours of daylight at the South Pole.
Answer: D
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

63) Which of the following is TRUE of the September equinox?
A) All latitudes on Earth, except the equator, experience unequal daylengths.
B) The subsolar point is at the Tropic of Cancer (23.5° N).
C) The Sun rises at the South Pole, where it will remain over the horizon for the following six months.
D) The Northern Hemisphere spring officially begins.
E) The subsolar point is at the Tropic of Capricorn (23.5° S).
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

64) Which of the following is TRUE of the March equinox?
A) Moving south of the equator, the daylength increases, while moving north of the equator the daylength decreases.
B) The Sun's direct rays strike perpendicular at the Tropic of Capricorn (23.5° S).
C) At all latitudes between the poles, day and night are of equal length.
D) In the Southern Hemisphere, it is known as the vernal equinox.
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

65) Based on your understanding of the march of the seasons, which of the following is TRUE of Quito, Ecuador, because it is less than a degree from the equator? (0° 15' N, 78° 35' S)?
A) Quito experiences days and nights of equal lengths throughout the year.
B) During the June Solstice, Quito experiences 24 hours of darkness because it is completely outside of the circle of illumination.
C) At noon on June 21st, the Sun is directly overhead in Quito.
D) Quito is at a latitude that is never the subsolar point.
Answer: A
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.5 Define Sun altitude, solar declination, and daylength.

66) On Earth, the Sun passes directly overhead at 25° north latitude _____ times a year.
A) 0
B) 1
C) 2
D) 4
Answer: A
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.5 Define Sun altitude, solar declination, and daylength.

67) On the June Solstice, this area experiences 24 hours of daylight
A) between the Tropic of Cancer and the Arctic Circle.
B) between the Tropic of Capricorn and the Antarctic Circle.
C) above the Arctic Circle.
D) below the Antarctic Circle.
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

68) Which of the following statements is TRUE?
A) The Northern Hemisphere vernal equinox is the Southern Hemisphere autumnal equinox.
B) The Northern Hemisphere vernal equinox is also the Southern Hemisphere vernal equinox.
C) The Northern Hemisphere vernal equinox is the Southern Hemisphere winter solstice.
D) The Northern Hemisphere vernal equinox is the Southern Hemisphere summer solstice.
Answer: A
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

69) Which of the following is TRUE for observers in the Northern Hemisphere?
A) Daylength becomes increasingly longer during the period from the summer solstice until the winter solstice.
B) Daylength decreases from the winter solstice until the vernal equinox, when it begins to increase.
C) Daylength is longest on the summer solstice and is shortest on the winter solstice.
D) Daylength variations are negligible for all locations throughout the year except above the Arctic Circle.
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

70) The Tropic of Cancer refers to
A) the parallel that is at 23.5° south latitude.
B) the location of the subsolar point on September 22.
C) the parallel that is the farthest northern location for the subsolar point during the year.
D) 0° latitude when the Sun crosses the equator.
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

71) The equinox
A) occurs four times during the year.
B) has 12 hours of day and 12 hours of night for all locations.
C) is the longest day of the year at any given place.
D) is when the subsolar point is at one of the tropics.
Answer: B
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

72) The Tropic of Capricorn refers to
A) that parallel that is 23.5° south latitude.
B) the location of the subsolar point on September 22.
C) the parallel that is the farthest northern location for the subsolar point during the year.
D) that parallel that is 66.5° south latitude.
Answer: A
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

73) The longest days of the year in the Southern Hemisphere are experienced at the Northern Hemisphere's
A) summer solstice.
B) spring equinox.
C) winter solstice.
D) autumn equinox.
Answer: C
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

74) The longest days of the year in the Northern Hemisphere are at the
A) time that the Sun is directly overhead at the Tropic of Cancer.
B) vernal equinox.
C) winter solstice.
D) autumnal equinox.
Answer: A
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

75) Which of the following relationships is CORRECT?
A) December solstice—subsolar point is at 23.5 north latitude.
B) March equinox—subsolar point is at 0° latitude.
C) September equinox—subsolar point is at 23.5° south latitude.
D) June solstice—subsolar point is at 23.5 south latitude.
Answer: B
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

76) Air consists of
A) a mixture of gases that behaves as if it were a single gas.
B) gases that are not well mixed.
C) oxygen only.
D) mostly carbon dioxide and water vapor.
Answer: A
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

77) The top of Earth's atmosphere, the thermopause, is approximately
A) 32,000 km (19,880 mi) above Earth's surface.
B) 480 km (300 mi) above Earth's surface.
C) 2,000 km (1,243 mi) above Earth's surface.
D) 1,000 km (621 mi) above Earth's surface.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.7 Explain the relationship between air pressure, density, and altitude.

78) At sea level, the pressure of the atmosphere is about _____ kg/cm^2.
A) 1.0
B) 2.6
C) 8.2
D) 6.7
Answer: A
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.7 Explain the relationship between air pressure, density, and altitude.

79) Which of the following is FALSE?
A) Air pressure decreases through the troposphere then increases in the stratosphere.
B) Air molecules exert air pressure through their motion, size, and number.
C) The atmosphere exerts a force of 1 kg/cm^2 (14.7 lb/in^2).
D) Air pressure decreases with increasing altitude.
Answer: A
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.7 Explain the relationship between air pressure, density, and altitude.

80) Half of the total mass of Earth's atmosphere lies below an elevation of _____ meters.
A) 14,000
B) 11,000
C) 8300
D) 5500
Answer: D
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.7 Explain the relationship between air pressure, density, and altitude.

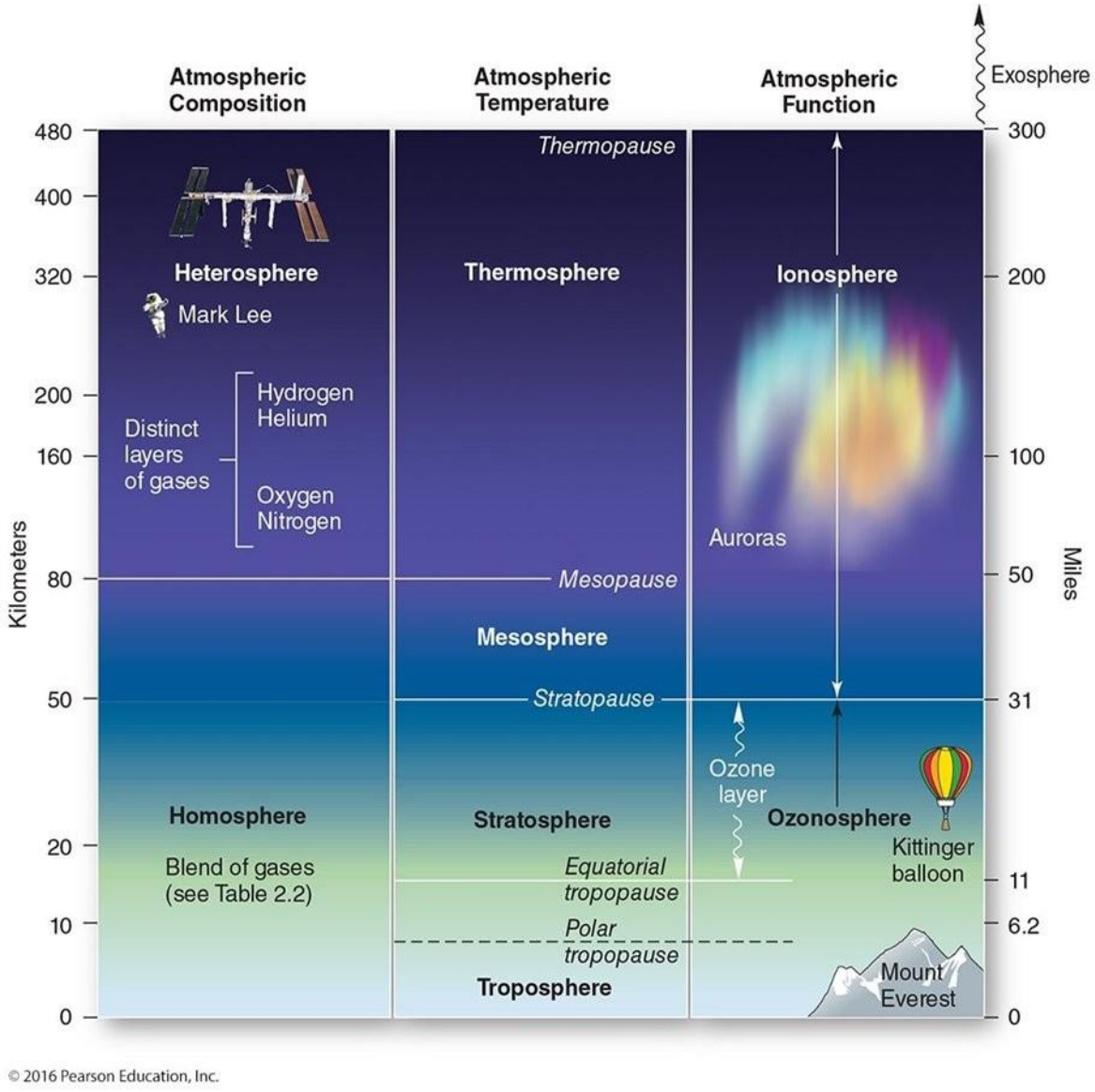
81) Which of the following is TRUE about Earth's atmosphere?
A) It allows gamma rays and X-rays to reach the surface.
B) The ozonosphere and ionosphere shield the surface from harmful radiation.
C) Variable gases are the dominant gases in the atmosphere.
D) It is denser at higher altitudes.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

82) Three criteria used for classification of the atmosphere are
A) structure, origin, temperature.
B) structure, origin, evolution.
C) composition, origin, evolution.
D) composition, temperature, function.
Answer: D
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

83) Based on composition, the atmosphere is divided into
A) one continuous region.
B) two broad classifications: homosphere and heterosphere.
C) two functional areas that absorb radiation from the Sun.
D) the troposphere and the stratosphere.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

84) Based on temperature, the atmosphere is divided into
A) four regions: ranging from the troposphere to the thermosphere.
B) two broad regions.
C) two functional areas that absorb radiation from the Sun.
D) nitrogen, oxygen, argon.
Answer: A
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

85) Based on function, the atmosphere has
A) five regions beginning with the outermost thermosphere.
B) two regions that absorb radiation from the Sun.
C) one continuous region.
D) the troposphere and the stratosphere.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.



86) Based on the image, which of the following must be TRUE?
A) Gases in the heterosphere are well mixed.
B) The ozonosphere stretches from Earth's surface to approximately 50 km (30 mi.)
C) All but 0.001 percent of the atmosphere is accounted for within the troposphere.
D) The ozonosphere corresponds with the stratosphere.
Answer: D
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

87) The thermosphere most closely corresponds to
A) the ozonosphere.
B) the heterosphere.
C) the homosphere.
D) the exosphere.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 3. Read and interpret graphs and data.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

88) The outermost region of the atmosphere, based on the criteria of composition, is the
A) homosphere.
B) heterosphere.
C) troposphere.
D) thermosphere.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

89) The heterosphere is the layer of the atmosphere in which the gases are _____ because of _____.
A) well mixed; thermal motions (i.e., convection)
B) well mixed; the influence of gravity which causes gases of different weight to diffuse randomly
C) poorly mixed; thermal motions (i.e., convection)
D) poorly mixed; the influence of gravity which causes gases of different weight to separate into layers
Answer: D
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

90) Which of the following is TRUE of gases in the heterosphere?
A) The hydrogen, helium, oxygen and nitrogen are well mixed.
B) The hydrogen and helium occur at the top of the heterosphere, and the nitrogen and oxygen at the bottom.
C) The nitrogen and oxygen occur at the top of the heterosphere and the hydrogen and helium at the bottom.
D) Nitrogen occurs at the top, followed—in descending order—by helium, oxygen and hydrogen.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

91) The region of the atmosphere that is so evenly mixed that it behaves as if it were a single gas is the
A) homosphere.
B) heterosphere.
C) exosphere.
D) thermosphere.
Answer: A
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

92) The thermopause is located
A) between the mesosphere and the thermosphere.
B) wherever -90°C (-130°F) is recorded.
C) approximately 480 km (300 mi.) above Earth's surface.
D) at the bottom of the homosphere.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

93) The highest temperatures in the atmosphere occur in the
A) troposphere.
B) stratosphere.
C) mesosphere.
D) thermosphere.
Answer: D
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

94) The tropopause altitude is highest _____ because of the _____.
A) at the equator; intense heating from the surface
B) at the poles; diffuse solar radiation
C) during the summer; increased atmospheric pressure
D) during the winter; Sun's direct rays hitting the Tropic of Capricorn
Answer: A
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

95) Despite its high temperatures, why would the thermosphere feel cold to humans?
A) The number of molecules is not high enough to transfer heat to human's skin.
B) Humans would die due to pressure changes before they could experience the intense heat.
C) The atmosphere is denser in the thermosphere and this pressure reduces heat transfer.
D) The average kinetic energy is actually less in the thermosphere than the troposphere.
Answer: A
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

96) Temperatures within the stratosphere
A) decrease with altitude according to the normal lapse rate.
B) remain about the same from the tropopause to the stratopause.
C) increase with altitude because of the absorption of ultraviolet radiation.
D) decrease with altitude due to radiation losses.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

97) In the upper thermosphere
A) high temperatures are produced by the absorption of UV radiation.
B) there is high temperature but low heat.
C) there is high heat, but low temperatures.
D) high temperatures produce a tremendous amount of heat transfer.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

98) In which two atmospheric zones does temperature increase with altitude?
A) Troposphere and mesosphere
B) Troposphere and stratosphere
C) Stratosphere and mesosphere
D) Stratosphere and thermosphere
Answer: D
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

99) In which two atmospheric zones does temperature decrease with altitude?
A) Troposphere and mesosphere
B) Troposphere and stratosphere
C) Stratosphere and mesosphere
D) Stratosphere and thermosphere
E) Temperature decreases with increasing altitude in all layers of the atmosphere.
Answer: A
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

100) Why does temperature increase with altitude in the stratosphere?
A) Due to the effects of the normal lapse rate effect
B) Chlorofluorocarbons increase ozone concentrations, which enhance temperature.
C) Ozone absorbs ultraviolet radiation from the Sun and then reradiates it as heat.
D) Ozone acts as a greenhouse gas which traps ultraviolet energy radiated by Earth's surface.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

101) Why is the hole in the ozone greatest over Antarctica?
A) Ozone is destroyed when it interacts with the Antarctic ice sheet.
B) South American countries have not ratified the Montreal Protocol and continue to release ozone-destroying CFCs.
C) Chlorine migrates to the Antarctic region, where it interacts with stratospheric ice clouds.
D) Ozone has highest concentration in Antarctica.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

102) Which of the following best describe conditions in the mesosphere?
A) Temperatures rapidly increase with altitude in the mesosphere.
B) Temperatures decrease with altitude in the mesosphere.
C) The mesosphere is completely within the heterosphere.
D) The mesosphere is located between the troposphere and the stratosphere.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

103) The high temperatures in the thermosphere occur because
A) infrared radiation from the ground heats this layer more than any other layer.
B) methane is such an effective greenhouse gas.
C) carbon dioxide has accumulated to very high levels in this layer.
D) it is in direct contact with high energy solar radiation.
Answer: D
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

104) Which of the following is TRUE of the ionosphere?
A) It primarily absorbs harmful infrared wavelengths.
B) All radio signals pass through this region virtually unaffected.
C) The region principally absorbs gamma rays, X-rays, and interacts with the solar wind.
D) It is being depleted through interactions with human-produced chlorofluorocarbons.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

105) Which of the following lists the CORRECT sequence of gases, from most to least concentration, in terms of percentage within the homosphere?
A) Nitrogen, argon, oxygen, xenon, carbon dioxide
B) Nitrogen, oxygen, argon, carbon dioxide, trace gases
C) Oxygen, ozone, nitrogen, PAN, carbon dioxide
D) Oxygen, nitrogen, neon, hydrocarbons, carbon dioxide
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

106) The three constant (i.e., nonvariable) gases in the atmosphere, in order of abundance from most to least, are
A) carbon dioxide, argon, oxygen.
B) oxygen, carbon dioxide, argon.
C) nitrogen, oxygen, argon.
D) oxygen, argon, nitrogen.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

107) The two most abundant gases in the atmosphere are
A) water vapor and carbon dioxide.
B) nitrogen and water vapor.
C) nitrogen and oxygen.
D) oxygen and carbon dioxide.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

108) Nitrogen is
A) integrated into our bodies directly from the air.
B) cycled through the environment by the activity of bacteria and plants.
C) a variable gas.
D) now measured at 20.946% by volume in the homosphere.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

109) Which of the following is NOT true of carbon dioxide?
A) It is critically important in regulating the temperature of the planet.
B) Today, it far exceeds its natural range of 180 to 300 ppm.
C) It occurs in large amounts in the atmosphere relative to nitrogen and oxygen.
D) It is a greenhouse gas.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

110) About half of Earth's crust consists of compounds containing
A) nitrogen.
B) argon.
C) carbon dioxide.
D) oxygen.
E) ozone.
Answer: D
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

111) Oxygen (O_2) is
A) a gas which principally originates from volcanic sources.
B) a by-product of photosynthesis.
C) a greenhouse gas.
D) now measured at 78.084% by volume in the homosphere.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

112) Which constant gas in the atmosphere is inert and unusable in life processes?
A) Oxygen
B) Nitrogen
C) Argon
D) Carbon dioxide
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

113) A by-product of photosynthesis is
A) nitrogen.
B) argon.
C) oxygen.
D) xenon.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

114) Which of the gases listed below has accumulated in the atmosphere as a result of biological processes?
A) Argon
B) Oxygen
C) Nitrogen
D) Xenon
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

115) Which is TRUE of the amount of CO_2 in our atmosphere?

A) CO_2 is the most abundant gas in the atmosphere.

B) The level of CO_2 has been decreasing at the rate of 3.1% per year since 2000.

C) It has been increasing steadily for the past 200 years.

D) The level of CO_2 has been much higher during the past 800,000 years than it is now.

Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

116) Which is TRUE of the level of CO_2 in our atmosphere?

A) It is now over 400 ppm.

B) The rate of increase leveled out in 1976.

C) The level of CO_2 was much higher in 1955 than today.

D) The level of CO_2 is decreasing at 3.1% per year.

Answer: A
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

117) Which of the following is TRUE regarding the depletion of ozone in the ozonosphere?

A) The depletion is restricted to the tropics.

B) It results from chemical reactions with chlorine derived from CFCs.

C) It results from the burning of fossil fuels.

D) The notion that ozone is being depleted as a result of human activity has little scientific evidence to support it.

Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

118) The ozonosphere is critical to life because it
A) affects temperatures.
B) absorbs visible light wavelengths.
C) absorbs most ultraviolet wavelengths.
D) produces the auroras.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

119) The homosphere is so called because
A) it is the habitable sphere for humans (Homo sapiens).
B) scientists have been unable to determine its composition and assume it is homogeneous.
C) the blend of gases is nearly uniform throughout.
D) it contains only one gas, nitrogen.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.8 Describe the composition of the atmosphere.

120) Which of the following is TRUE of the mesosphere?
A) Temperature at the top of the mesosphere is -90°C (-130°F).
B) Temperatures are uniform through the zone.
C) It is the warmest layer of the atmosphere.
D) It has the greatest vertical extent of all atmospheric layers.
Answer: A
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

121) In 1974, Dr. Rowland and Dr. Molina made what observation regarding ozone (O_3)?
A) The photochemical interactions of chlorofluorocarbons and O_3.
B) Automobile exhaust and sunlight were producing photochemical smog.
C) Anthropogenic O_3 releases were a major culprit in global warming.
D) Ground-level O_3 irritates human eyes and respiratory systems.
Answer: A
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

122) Which of the following is TRUE of chlorofluorocarbons?
A) They have been used as propellants in spray cans.
B) They are used in refrigeration systems.
C) They are used to make foam products.
D) They have been used as propellants, in refrigeration systems, and to make foam products.
Answer: D
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

123) Which of the following is TRUE of chlorofluorocarbons?
A) The CFC molecules react with ultraviolet light to release carbon which then destroys ozone.
B) The CFC molecules react with ultraviolet light to release fluorine which then destroys ozone.
C) The CFC molecules react with ultraviolet light to release chlorine which then destroys ozone.
D) Most of the CFC-induced ozone destruction is occurring near the equator, rather than near the poles.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

124) The Montreal Protocol
A) established a framework to address acid precipitation.
B) aims to reduce and eliminate all ozone depleting substances.
C) only addresses CFCs.
D) created the Intergovernmental Panel on Climate Change.
E) is ineffective because so few countries have ratified it.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

125) Why is stratospheric ozone loss a concern?
A) Stratospheric ozone is a major greenhouse gas; its loss will contribute to the cooling of the planet.
B) Without stratospheric ozone more harmful ultraviolet radiation (UVB and UVC) reaches the surface.
C) Stratospheric ozone is a component of photochemical smog.
D) Stratospheric ozone contributes to the brilliant auroras.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

126) Which of the following is NOT true of UV exposure?
A) 95% of all UVA radiation reaches Earth's surface.
B) Only exposure to UVA is a concern, not exposure to UVB and UVC.
C) UV radiation is potentially harmful and individuals should take appropriate precautions depending on the UV index.
D) UV radiation varies spatially according to the season, local weather conditions, and overhead ozone depletion.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

127) Which of the following is TRUE regarding ozone depletion in Antarctica?
A) Increasing levels of ultraviolet radiation have not actually been measured at this time.
B) The atmosphere above Antarctica has experienced a complete loss of protective ozone.
C) The lowest ozone levels occur during the Antarctic spring, following the development of polar stratospheric clouds in winter.
D) There has actually been a decrease in ultraviolet levels measured at the surface—which is contrary to what is predicted by ozone depletion models.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

128) Life in the atmosphere is found in the
A) heterosphere.
B) troposphere.
C) ozonosphere.
D) lithosphere.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

129) The tropopause occurs at a _____ elevation above the tropics than above the poles because _____.
A) lower; the stratosphere is thicker over the tropics and so it compresses the troposphere
B) lower; the troposphere weighs more in the tropics and so it sinks
C) higher; the troposphere is hotter in the tropics, and this causes the air to rise to greater heights
D) higher; the stratosphere is thinner over the tropics and this allows the troposphere to expand
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

130) Which of the following is CORRECT regarding lapse rates in the troposphere?
A) The term "normal (average) lapse rate" refers to the actual lapse rate in effect at any particular time.
B) The environmental lapse rate refers to the actual lapse rate at any particular time and may differ substantially from the normal lapse rate.
C) The normal lapse rate is always the same as the dry adiabatic rate (DAR).
D) Temperatures generally increase with altitude in the troposphere.
Answer: B
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

131) Which atmospheric zone is the region of principal weather activity?
A) thermosphere
B) mesosphere
C) stratosphere
D) troposphere
Answer: D
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

132) Which of the following is NOT true about the troposphere?
A) The height of the top of the troposphere (the tropopause) varies with season and latitude.
B) Approximately 90% of the total mass of the atmosphere is within the troposphere.
C) Temperatures increase with altitude in the troposphere because the higher in altitude, the closer to the Sun.
D) The bulk of all water vapor occurs in the troposphere.
Answer: C
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

133) In terms of sunlight passing through the atmosphere, which is the CORRECT order?
A) Troposphere, stratosphere, mesosphere, thermosphere
B) Thermosphere, mesosphere, stratosphere, troposphere
C) Mesosphere, thermosphere, troposphere, stratosphere
D) Stratosphere, troposphere, thermosphere, mesosphere
Answer: B
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

134) Air pollution consists of
A) both natural and anthropogenic gases, particles, and other substances in amounts that cause damage to the environment or are harmful to humans.
B) solely anthropogenic gases, particles, and other substances in amounts that cause damage to the environment or are harmful to humans.
C) solely natural gases, particles, and other substances in amounts that cause damage to the environment or are harmful to humans.
D) a distinct class of gases, particles, and other substances that the EPA has deemed worthy of regulating.
Answer: A
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

135) Which of the following is TRUE?
A) Natural sources of air pollution are not a concern in terms of human health.
B) Natural sources of air pollution are a relatively new occurrence.
C) Though infrequent, natural events that produce air pollution may cover large areas.
D) There is no reason to be concerned about natural sources of air pollution.
Answer: C
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

136) Temperature inversions occur
A) when surface temperatures are warmer than overlying layers of air.
B) when there is lots of mixing of surface air with the air above.
C) when surface temperatures are cooler than overlying air.
D) during episodes of reduced air pollution.
Answer: C
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

137) How do temperature inversions affect air pollution at the surface?
A) Mesospheric conditions are replicated in the troposphere.
B) Pollutants are trapped under the inversion layer and do not mix with the air above.
C) Surface air pollution is reduced by surface air mixing with the air above.
D) Air pollution is completely inhibited from forming.
Answer: B
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

138) Sources of natural variable pollutants and materials include all of the following EXCEPT
A) volcanoes.
B) forest fires.
C) plants and decaying plants.
D) industrial activity.
Answer: D
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

139) With regards to carbon monoxide (CO), which of the following is FALSE?
A) Anthropogenic CO is produced by automobiles.
B) CO is harmful to humans because it deoxygenates blood.
C) Few effects of CO on humans have been identified.
D) It is a colorless, odorless and tasteless gas.
Answer: C
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

140) Carbon monoxide is potentially dangerous because it
A) replaces oxygen on red blood cells.
B) causes cancer.
C) causes birth defects.
D) causes genetic mutations.
Answer: A
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

141) The reaction of automobile exhaust and ultraviolet light
A) produces photochemical smog.
B) produces industrial smog.
C) is affecting the stratospheric ozone concentration.
D) forms smoke and fog.
Answer: A
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

142) Photochemical smog developed with the advent of
A) coal burning stoves.
B) the industrial revolution.
C) smelting of ores.
D) automobiles.
Answer: D
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

143) Photochemical reactions produce
A) principally sulfur dioxides.
B) particulates such as dust, dirt, soot, and ash.
C) ozone and peroxyacetyl nitrates (PAN).
D) carbon monoxide.
Answer: C
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

144) Acid deposition results from
A) carbonic acids dissolved from atmospheric carbon dioxide.
B) nitric acid and sulfuric acid, formed from nitrogen oxides and sulfur dioxide.
C) hydrocarbons, nitrogen dioxide, and carbon monoxide.
D) hydrochloric acid, formed from the combination of hydrogen chloride and water.
Answer: B
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

145) O_3 (ozone) in the lower troposphere
A) forms acid rain.
B) is not associated with transportation.
C) causes lung irritation, asthma, and susceptibility to respiratory illness in humans.
D) does not cause any damage to crops and plants.
Answer: C
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

146) Which of the following is NOT a result of acid deposition?
A) Acidification of lakes
B) Release of aluminum and magnesium from clay mineral in soils
C) Formation of highly toxic methylmercury in acidified lake waters
D) Increase in nutrients in forest ecosystems
Answer: D
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

147) Which of the following statements about ozone is FALSE?
A) Ozone in the stratosphere protects human health.
B) Ozone in the troposphere protects human health.
C) Stratospheric ozone absorbs harmful radiation.
D) Tropospheric ozone is a component of photochemical smog.
Answer: B
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

148) The single major source for photochemical reactants in the United States are
A) steel mills and the agricultural industry.
B) electrical generation stations.
C) automobiles.
D) rapid transit, buses, and excessive use of light rail systems.
Answer: C
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

149) Industrial smog is
A) associated with photochemistry.
B) principally associated with coal-burning industries.
C) a relatively recent problem that developed during the latter half of this century.
D) principally associated with transportation.
Answer: B
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

150) Which of the following is NOT true regarding the oxides of sulfur and nitrogen?
A) They lead to the formation of airborne sulfuric and nitric acid.
B) They are produced by industry and transportation.
C) They are causing major environmental problems in Europe and Asia.
D) They are naturally occurring and, therefore, not considered pollutants.
Answer: D
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

151) What two pollutants react with water to produce acid rain?
A) Sulfur oxides and nitrogen oxides
B) Sulfur oxides and ozone
C) Nitrogen oxides and ozone
D) Sulfur oxides and PAN
Answer: A
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

152) Which of the following is TRUE regarding acid deposition?
A) Acids have been causally linked to fish kills in the northeastern United States.
B) Acid precipitation is precipitation that measures more than 7.0 on a pH scale.
C) No lakes or streams have been damaged by acid precipitation.
D) Soil processes generally are not affected by acid precipitation.
Answer: A
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

153) The lower the pH of a liquid
A) the more acidic it is.
B) the more basic (alkaline) it is.
C) the more neutral it is.
D) the more chemical reactive it is.
Answer: A
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

154) Given the pH scale is logarithmic where each whole number represents a tenfold increase, a rain with a pH of 3 is how many times more acidic than rain with a pH of 7?
A) 3
B) 4
C) 100
D) 10,000
E) 1,000,000,000
Answer: D
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

155) What percentage of the U.S. population lives with unhealthy levels of air pollution?
A) 30%
B) 40%
C) 50%
D) 60%
Answer: B
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

156) The main ingredients in photochemical smog are
A) ozone, PAN, and nitric acid.
B) PAN, nitric acid, and carbon monoxide.
C) ozone, particulate matter, and carbon monoxide.
D) PAN, carbon monoxide, and particulate matter.
Answer: A
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 3/4 Application/Analysis
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

157) Particulate matter
A) does not include aerosols.
B) can include material in smoke.
C) has not yet been studied by scientists.
D) has not been associated with health risks.
Answer: B
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

158) The Clean Air Act
A) has not been amended.
B) did not result in significant reductions of any major air pollutants.
C) was made stronger during the Reagan administration.
D) has saved the country several trillion dollars.
Answer: D
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 1/2 Knowledge/Comprehension
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 2. Demonstrate the ability to think critically and employ critical thinking skills.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.

159) Why is the light year a useful unit of measurement for astronomical distances?
Answer: The size of the universe is vast; the light year is therefore a useful unit of measurement for distances of such galactic scale.
Chapter/Section: 2.1 Earth and the Solar System
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.1 Describe our Solar System.

160) Describe the causes and effects of the uneven distribution of insolation.
Answer: Due to Earth's curved surface, lower latitudes receive more concentrated direct insolation, while higher latitudes receive less concentrated, more diffuse insolation. This latitudinal imbalance in energy drives global circulation in the atmosphere and oceans.
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

161) Describe the radiation emitted from both the Sun and Earth in terms of the electromagnetic spectrum.
Answer: The Sun emits shortwave radiation primarily in the visible and infrared wavelengths, while Earth emits longwave radiation primarily in the thermal infrared wavelengths.
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.3 Explain the Sun's radiant energy and the electromagnetic spectrum.

162) How does the daily insolation received at the top of the atmosphere vary annually from lower to higher latitudes?
Answer: At lower latitudes, daily insolation is high throughout the year, with little variation month to month. At higher latitudes, insolation values are greatest in the summer months, lowest in the winter months, and vary greatly with latitude.
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.4 Illustrate the interception of solar energy at the top of the atmosphere.

163) Define these terms: thermopause, insolation, solar constant, subsolar point.
Answer: thermopause: outer boundary of Earth's energy system, the region at the top of the atmosphere (approx. 480 km); insolation: incoming solar radiation; solar constant: average insolation received at the thermopause when Earth is at its average distance from the Sun (1372 W/m^2); subsolar point: the only point where insolation arrives perpendicular to the surface.
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.5 Define Sun altitude, solar declination, and daylength.

164) What are the primary factors that contribute to seasonality on Earth?
Answer: Earth's revolution around the Sun; Earth's rotation on its axis; Earth's axial tilt; axial parallelism; and Earth's sphericity.
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

165) Explain the significance of each of the equinoxes and solstices.
Answer: The equinoxes mark the beginning of the spring and fall, all locations on Earth between the poles have equal daylengths; and it marks the sunrise/set at the poles. The solstices mark the beginning of the summer and winter, are when the subsolar point is at its maximum latitude; and when either the Arctic (June solstice) or Antarctic (December Solstice) Circles are completely within the circle of illumination.
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

166) What is the circle of illumination and its importance?
Answer: The circle of illumination is the dividing line between day and night. Combined with the four factors that cause the seasons, the circle of illumination will influence daylength throughout the year.
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

167) For where you live, how do daylength and the Sun's altitude vary throughout the year?
Answer: Answers will vary depending on where students live.
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.5 Define Sun altitude, solar declination, and daylength.

168) Why are seasonal changes less noticeable near the equator than at midlatitudes?
Answer: Because the equatorial region receives fairly constant high insolation and has consistent daylength throughout the year, there are little seasonal variations; insolation varies throughout the year (as does daylength), there are greater season variations.
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

169) Draw and label a diagram of the Earth-Sun relationship for the four seasons. Include the average distance from Earth to the Sun, the location of the subsolar point for each seasonal event, and the name and date for each of the solstices and equinoxes.
Answer: Answers will vary. Figure GIA 2.1 is a good basis for the answer.
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

170) The atmosphere can be studied using three basic criteria: composition, temperature, and function. Discuss these three classifications, giving relevant details of each.
Answer: composition: homosphere and heterosphere; temperature: thermosphere, mesosphere, stratosphere, and troposphere; and function: ionosphere and ozonosphere. Students should provide relevant information about each.
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.8 Describe the composition of the atmosphere. 2.9 Draw a diagram showing atmospheric structure based on temperature. 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

171) Trace the changing temperature of the atmosphere from Earth's surface to the top of the thermosphere.
Answer: It follows a zig-zag pattern: decreases in troposphere, increases in stratosphere, decreases again in mesosphere, and increases in thermosphere.
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

172) List and describe the four main gases of the homosphere. Which is least important to life?
Answer: nitrogen, oxygen, argon, and carbon dioxide. Argon is least important to life (it is inert).
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.8 Describe the composition of the atmosphere.

173) Ozone is found in both the ozonosphere and as a component of smog. Discuss its properties and function in the ozonosphere, and also its destruction by anthropogenic chemicals and the international efforts undertaken to ameliorate the destruction. How is ground level ozone produced? What are the effects of ground level ozone?
Answer: In a nutshell, stratospheric ozone protects Earth from harmful UV radiation. Through a complex set of chemical reactions, CFCs and other ozone-destroying chemicals destroy ozone. International efforts, such as the Montreal Protocol, have sought to ban these chemicals. In the troposphere, though, ozone is a principal component of photochemical smog.
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

174) What is the role of ozone in the ozonosphere? Discuss and explain the chemical reactions that lead to its destruction.
Answer: In a nutshell, stratospheric ozone protects Earth from harmful UV radiation. Through a complex set of chemical reactions, CFCs and other ozone-destroying chemicals destroy ozone.
Chapter/Section: 2.4 Earth's Atmosphere
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.10 Describe the atmospheric profile on the basis of function, focusing on the ozone layer.

175) List and describe at least five natural sources of air pollution, as well as the source and effects of at least eight human-generated air pollutants.
Answer: Natural: volcanoes, forest fires, plants, soil, and oceans. Anthropogenic: carbon monoxide, nitrogen oxides, VOCs, ozone, PANs, sulfur oxides, PM, carbon dioxide, etc.
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

176) What have been some of the significant achievements of the Clean Air Act?
Answer: Significant reductions in atmospheric pollution, direct economic benefits, has saved lives, etc.
Chapter/Section: 2.5 Pollutants in the Atmosphere
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 07. The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.9 Draw a diagram showing atmospheric structure based on temperature.

177) Discuss ways in which anthropogenic climate change affects seasonality.
Answer: There are several examples given in the book, but students can select others, as well. Seasonal shifts in the subtropical high pressure zone in Africa are leading to decreased rainfall; in the United States, the trend has been towards a longer growing season; and in Alaska, longer summers have changed migration patterns of moose.
Chapter/Section: 2.6 The Human Denominator
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 14. How human actions modify the physical environment.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.6 Describe the annual variability of solar altitude, solar declination, and daylength—Earth's seasonality.

178) Describe how anthropogenic activity may influence both the troposphere and the stratosphere.
Answer: Troposphere: various types of pollution; Stratosphere: ozone depletion.
Chapter/Section: 2.6 The Human Denominator
Bloom's Taxonomy: 5/6 Synthesis/Evaluation
Geo Standard: 14. How human actions modify the physical environment.
Global Sci. LO: 8. Communicate effectively in writing.
LO: 2.11 Describe natural and anthropogenic pollutants in the lower atmosphere.