Geosystems: An Introduction to Physical Geography, 10e **(Christopherson)**
Chapter 2 Solar Energy to Earth and the Seasons

1) The Goldilocks zone is best described as
A) any area on a planet in our solar system in ample solar radiation is received, enabling conditions in which rudimentary life may yet evolve.
B) the regions on Earth that receives the "just right" combination of solar energy and precipitation, enabling life to flourish.
C) an area of orbit about a star where conditions make it "just right" for living organisms, i.e. a habitable zone.
D) orbital zones in other solar systems in which the "three bears," i.e. a star, a moon, and an Earth-sized planet are found.
E) regions of space in which Earth-size planets are found and, therefore, may be "just right" for human colonization.
Answer: C
Diff: 1
Chapter/Section: 2.1 The Solar System
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.1 Locate Earth in the Universe, describe the formation of our Solar System, and sketch Earth's orbital path around the Sun.

2) Which of the following is *not* true about the Milky Way Galaxy in which we live?
A) It is one of millions of galaxies in the universe.
B) It is the largest galaxy in the universe.
C) It is a spiral-shaped galaxy.
D) It contains approximately 300 billion stars.
E) A supermassive black hole sits in the galactic center.
Answer: B
Diff: 1
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3) Which of the following is true?
A) The Sun is also a planet.
B) The Milky Way Galaxy contains over 300 million stars.
C) Earth is the fourth planet from the Sun in our Solar System.
D) The Sun is the largest star in the Milky Way Galaxy.
E) The Milky Way is part of our Solar System
Answer: B
Diff: 1
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4) Our Solar System is embedded in the _____ of the Milky Way.
A) Scutum-Centaurus Arm
B) Perseus Arm
C) Cygnus X complex
D) Orion Spur of the Sagittarius Arm
E) Vela Molecular Ridge
Answer: D
Diff: 1
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5) Our Solar System consists of
A) a supermassive blackhole, Sagitarrius A*, in the Solar System middle.
B) 8 planets, more than 100 moons, dwarf planets, comets, asteroids, and meteors.
C) 4 stars, the Sun and the Alpha Centauri star system (Alpha Centauri A, B, and C).
D) 9 planets, 7 moons, and two dwarf planets (Pluto and Ceres).
E) 200 moons, six planets, and approximately 30 dwarf planets.
Answer: B
Diff: 1
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6) The planetesimal hypothesis pertains to the formation of the
A) ocean basins.
B) universe.
C) galaxies.
D) planets.
E) black holes.
Answer: D
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7) The basic idea behind the planetesimal hypothesis is that
A) small grains of cosmic dust and other solids gradual accrete to form planetesimals that may grow to become protoplanets and eventually planets.
B) cosmic debris from the Big Bang coalesced to form planets as they neared the gravitational pull of the Sun.
C) planets form as a direct result of the nuclear fusion of nebular gases.
D) early in the Solar System's history, a star passed near the Sun and pulled off gases that eventually condensed to form planets.
E) planets form from the remains of super-giant planetesimals that blow apart, thereby creating smaller objects—the planets.
Answer: A
Diff: 1
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8) Earth and the Sun formed specifically from
A) black holes.
B) unknown origins.
C) a nebula of dust and gases.
D) the Milky Way Galaxy.
E) other planets.
Answer: C
Diff: 1
Chapter/Section: 2.1 The Solar System
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9) Light travels at a speed of approximately
A) 80,500 kilometers per minute (50,000 miles per minute).
B) 80,500 kilometers per hour (50,000 mph).
C) 300,000 kilometers per hour (186,336 mph).
D) 1,000,000,000 kilometers per second (621,118,012 miles per second).
E) 300,000 kilometers per second (186,333 miles per second).
Answer: E
Diff: 1
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10) Which of the following does *not* accurately describe Earth's distance from the Sun?
A) Earth is closest to the Sun in January (perihelion).
B) The Earth-Sun distance averages 150 million kilometers (93 million miles).
C) Due to Earth's circular orbit, it is always equidistant from the sun throughout the year.
D) Earth is farthest away from the Sun in July (aphelion).
E) It takes light an average of 8 minutes and 20 seconds to travel from the Sun to Earth.
Answer: C
Diff: 1
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11) Earth's orbit around the Sun
A) is perfectly circular.
B) is elliptical.
C) has been constant since the birth of the Solar System.
D) results in a constant distance from the Sun throughout the year.
E) takes approximately the same amount of time as the orbit of other planets around the Sun.
Answer: B
Diff: 1
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12) Most of the processes in our biosphere are fueled by
A) energy derived from inside Earth.
B) radiant energy from the Sun.
C) tidal action of the Oceans and large lakes.
D) the moon.
E) utilities and oil companies.
Answer: B
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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13) Which of the following about the Sun is false?
A) The Sun is the largest star in the Milky Way Galaxy.
B) The principal outputs of the Sun consists of solar wind and radiant energy.
C) The Sun produces energy through fusion.
D) The Sun has average temperature, size, and color when compared to other Stars in our galaxy.
E) The Sun and Solar System are part of the Milky Way Galaxy.
Answer: A
Diff: 1
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14) A surface disturbance on the Sun's surface caused by magnetic storms is called a(n)
A) magnetic cyclone.
B) aurora.
C) solar wind.
D) sunspot.
E) electromagnetic spectrum.
Answer: D
Diff: 1
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15) Which of the following is *not* true of sunspots?
A) More sunspots indicate increased solar radiation.
B) Sunspots are brighter than the rest of the Sun's surface.
C) Sunspots can be up to 12 times larger than Earth.
D) Sunspots are surface disturbances caused by magnetic storms.
E) Sunspots can produce flares and prominences.
Answer: B
Diff: 1
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16) On average, solar maximums occur every _____.
A) 32 years
B) 365 days
C) 182 days
D) 11 years
E) 300 years
Answer: D
Diff: 1
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17) On its way to Earth, solar winds first encounter
A) the ionosphere.
B) the lower atmosphere.
C) the stratosphere.
D) the magnetosphere.
E) Earth's surface.
Answer: D
Diff: 1
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18) Earth's magnetosphere is generated by
A) nuclear fission in Earth's core.
B) nuclear fusion in Earth's core.
C) dynamo-like motions in Earth's interior.
D) gravitational accretion.
E) sun spot activity.
Answer: C
Diff: 1
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19) The auroras in the upper atmosphere are caused by
A) UV and visible light interaction with the asthenosphere.
B) interaction of the solar wind and upper layers of Earth's atmosphere.
C) sun spot activity and gravitational accretion.
D) coronal mass ejections entering the atmosphere at lower latitudes (below 30°).
E) stratospheric ozone depletion.
Answer: B
Diff: 1
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20) The electromagnetic spectrum encompasses
A) all possible wavelengths of electromagnetic energy.
B) only radiant energy within the visible light wavelength range.
C) thermal infrared through radiowaves only.
D) those wavelengths of electromagnetic energy greater than 3.00 μm.
E) those wavelengths of electromagnetic energy smaller than 0.01 μm.
Answer: A
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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21) The sun emits radiant energy composed of
A) mainly visible light and infrared energy.
B) mainly ultraviolet and X-rays.
C) thermal infrared through radiowaves only.
D) only radiant energy within the visible light wavelength range.
E) those wavelengths of electromagnetic energy smaller than 0.01 μm.
Answer: A
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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22) _____ is a measure of the average kinetic energy of individual molecules in matter.
A) Heat
B) Visible light
C) Temperature
D) Electromagnetic radiation
E) Thermal infrared through radiation
Answer: C
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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23) _____ is the flow of kinetic energy between molecules or from one body or substance to another resulting from a temperature difference between them.
A) Electromagnetic radiation
B) Visible light
C) Temperature
D) Heat
E) Thermal infrared through radiation
Answer: D
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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24) Comparing the three temperature scales, absolute zero is
A) -273° K.
B) 32° F.
C) 0° F.
D) 0° K.
E) 32° C.
Answer: D
Diff: 1
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25) Which of the following is true?
A) The Sun emits shortwave radiation, whereas Earth emits longwave radiation
B) Because the Sun is so far away, it is impossible to measure the wavelengths of its radiation.
C) While the wavelengths emitted by the Sun and Earth are mostly the same, Earth tends to emit more shortwave radiation than the Sun.
D) The radiation emitted by the Sun and Earth are roughly the same wavelength.
E) The Sun emits longwave radiation, whereas Earth emits shortwave radiation.
Answer: A
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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26) The sun radiates _____ concentrated around _____.
A) longer wavelength; 3.00 μm.
B) longer wavelength; 10^3 μm.
C) shorter wavelength; 0.5 μm.
D) shorter wavelength; 10^{-8} μm.
E) shorter wavelength; 0.001 μm.
Answer: C
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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27) The dominant wavelength emitted by Earth is
A) visible light.
B) X-ray radiation.
C) infrared.
D) gamma radiation.
E) microwave.
Answer: C
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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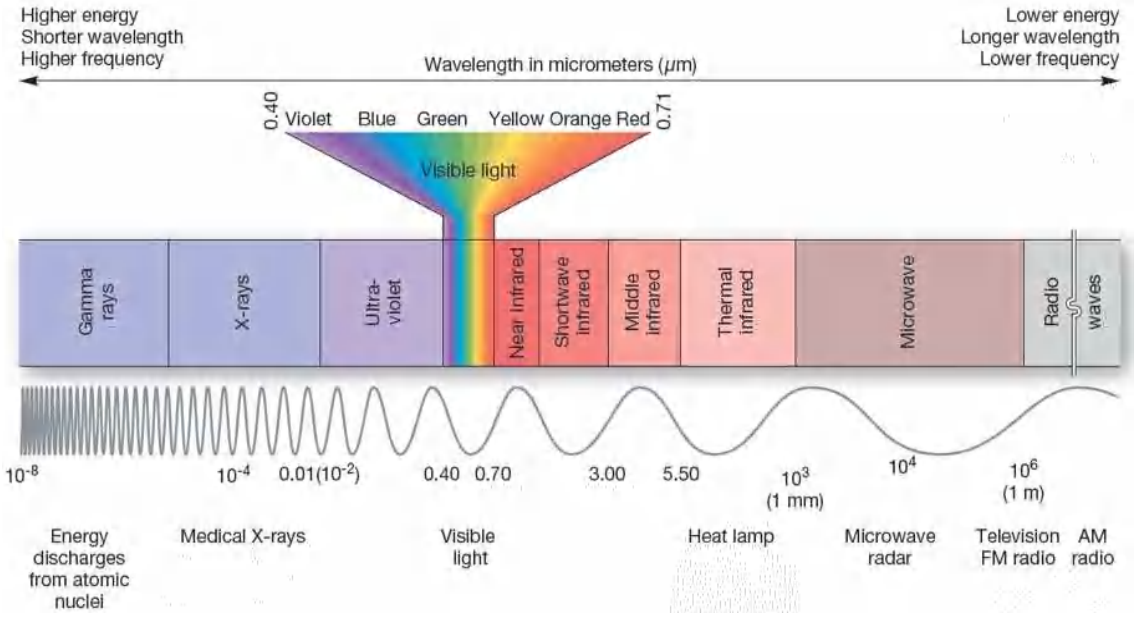
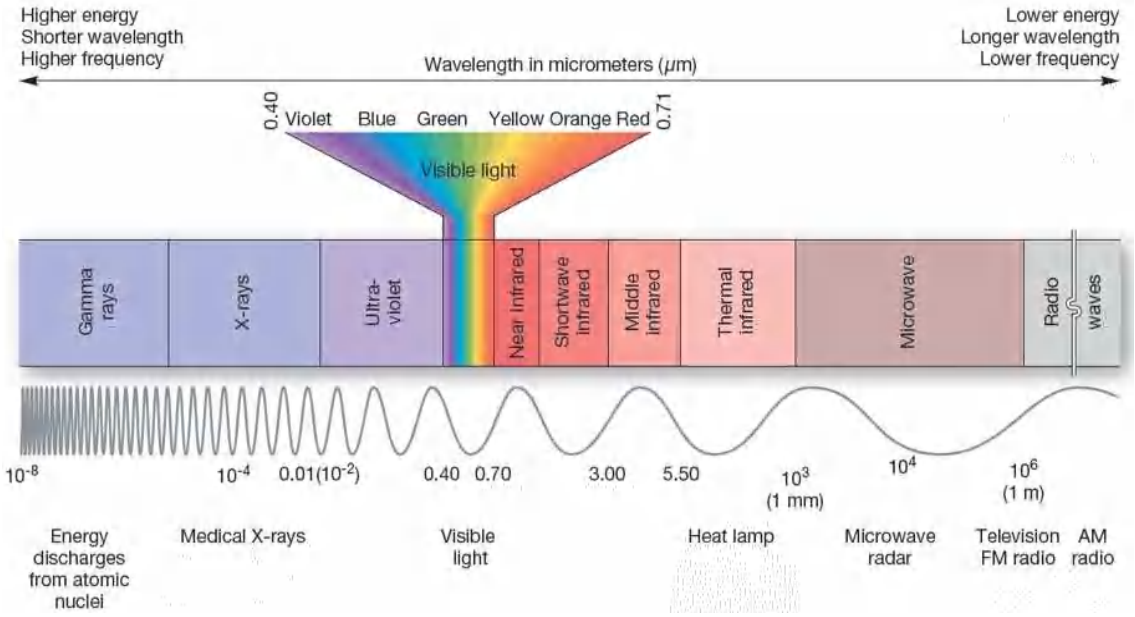
28)



A portion of the electromagnetic spectrum of radiant energy from the Sun

Which of the following sequences is arranged in order from shorter wavelength to longer wavelength?
A) visible, gamma rays, radio waves, infrared
B) gamma rays, microwaves, visible, X-rays
C) radio waves, visible, heat, X-rays
D) infrared, visible, ultraviolet, X-rays
E) X-rays, ultraviolet, visible, infrared
Answer: E
Diff: 2
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.2 Describe the Sun's operation, and explain the solar wind and the electromagnetic spectrum of radiant energy.

29)



A portion of the electromagnetic spectrum of radiant energy from the Sun

Which of the following is characterized by the longest wavelengths
A) X-rays
B) thermal infrared
C) radio waves
D) gamma rays
E) visible
Answer: C
Diff: 2
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.2 Describe the Sun's operation, and explain the solar wind and the electromagnetic spectrum of radiant energy.

30) The region at the top of the atmosphere located approximately 480 km (300 mi) above Earth's surface is known as the
A) perihelion.
B) apihelion.
C) sun spot.
D) aurora.
E) thermopause.
Answer: E
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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LO: 2.3 Illustrate the interception of solar energy and its uneven distribution at the top of the atmosphere.

31) Solar radiation that is intercept by Earth is called
A) insolation.
B) thermopause.
C) thermal infrared radiation.
D) solar constant.
E) solar wind.
Answer: A
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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32) The average insolation received by the thermopause when Earth is at its average distance from the sun is known as the
A) insolation.
B) energy balance.
C) solar constant.
D) aurora.
E) solar wind.
Answer: C
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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33) The solar constant is measured at
A) the thermopause.
B) the edge of the Sun's atmosphere.
C) Earth's surface.
D) the Sun's surface.
E) sea level.
Answer: A
Diff: 1
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34) What is the name of the location on Earth's surface that receives the Sun's perpendicular rays?
A) zenith
B) sun spot
C) azimuth
D) subsolar point
E) solar constant
Answer: D
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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35) The subsolar point occurs
A) only within a few degrees north or south of the equator.
B) at all latitudes at least once throughout the year.
C) only at lower latitudes between the Tropics (23.5° N/S).
D) at all latitudes between 60° N and S.
E) primarily in the Northern Hemisphere to 33.5° N.
Answer: C
Diff: 1
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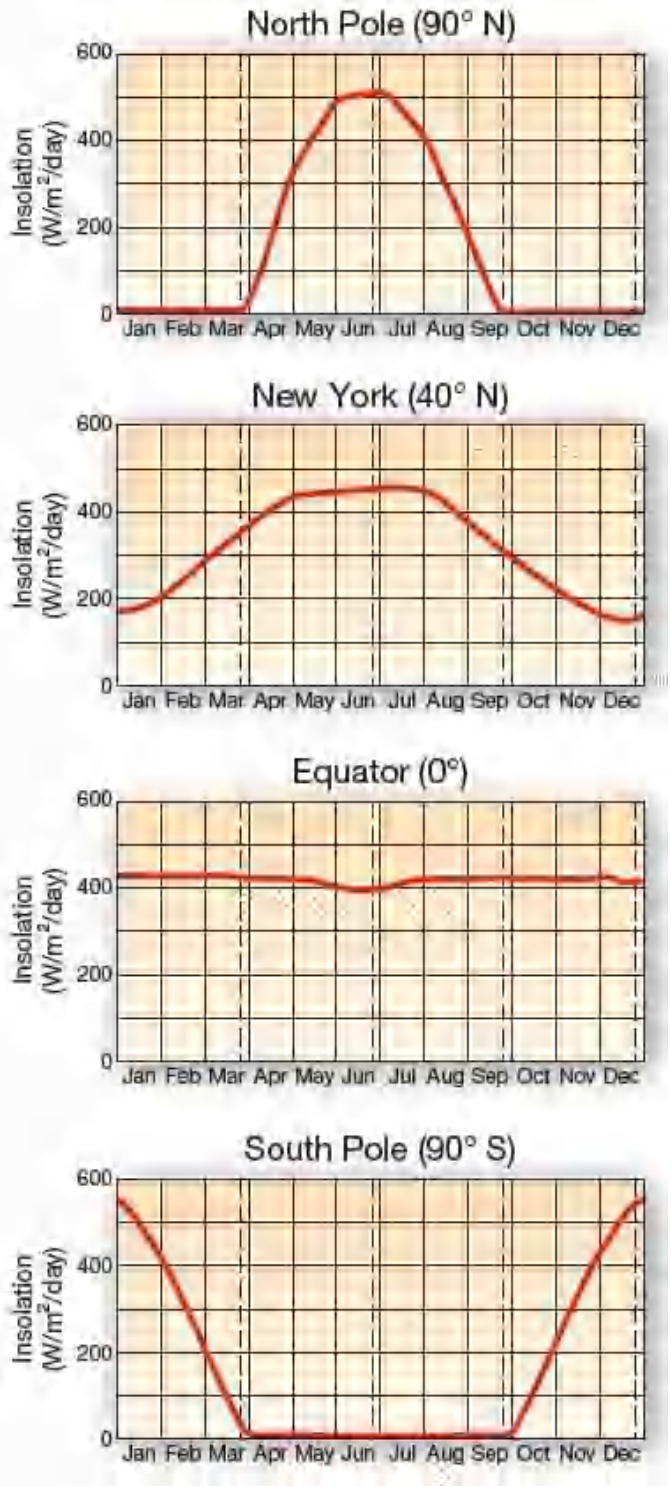
36)



Daily insolation received at the top of the atmosphere. The total daily insolation received at the top of the atmosphere is charted in watts per square meter per day for four locations (1 W/m2/day = 2.064 cal/cm2/day). The vertical dashed lines mark the equinoxes and solstices, two of each during the year.

Which of the following is true relative to insolation at the thermopause relative to latitude?

A) Annually, higher latitudes receive more insolation than lower latitudes.
B) Annually, insolation is evenly distributed with little change by latitude.
C) Annually, lower latitudes receive more insolation than the high latitudes.
D) Insolation can only be measured longitudinally, not latitudinally.
E) Insolation variations is governed by elevation, not latitude.
Answer: C
Diff: 2
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.3 Illustrate the interception of solar energy and its uneven distribution at the top of the atmosphere.

37) The uneven distribution of insolation by latitude is primarily a result of
A) Earth's curvature.
B) sun spot cycles.
C) variability in the Sun's output.
D) solar wind activity.
E) the changing distance of Earth from the Sun.
Answer: A
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
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38) The term "net radiation" refers to the
A) total amount of energy radiated by Earth.
B) total amount of energy received by Earth.
C) difference in the amount of incoming and outgoing radiation.
D) variations in insolation latitudinally due to solar wind activity.
E) variations in insolation latitudinally due to sun spot cycles.
Answer: C
Diff: 1
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: Remembering/Understanding
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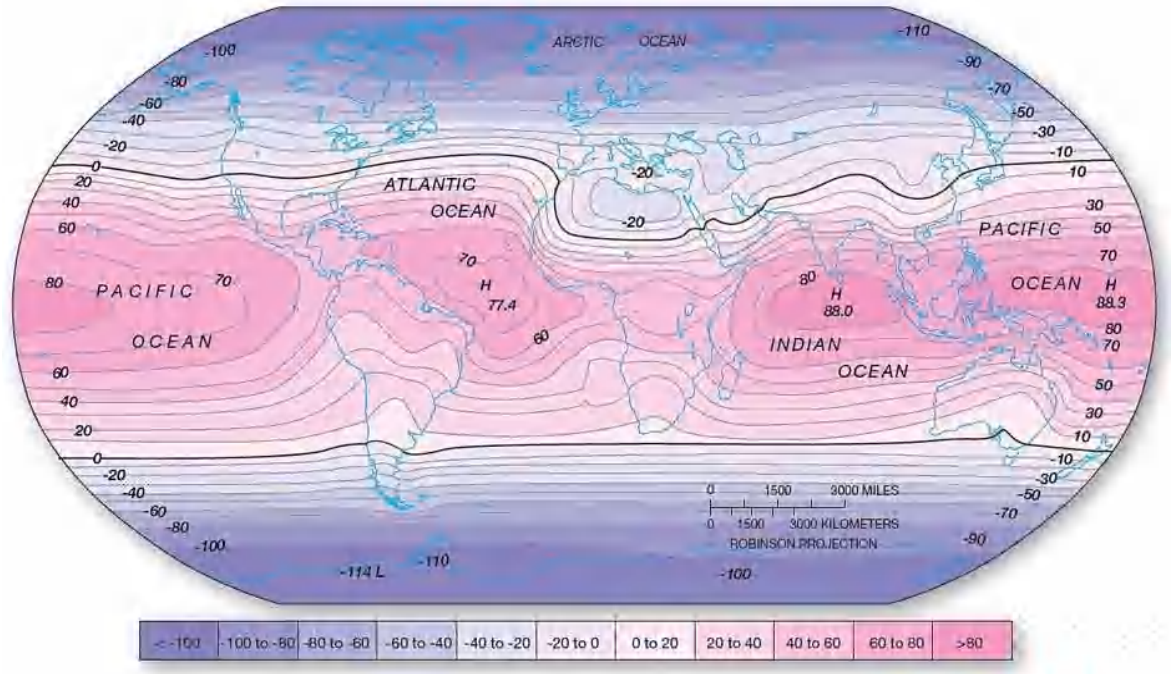
LO: 2.3 Illustrate the interception of solar energy and its uneven distribution at the top of the atmosphere.

39)



Daily net radiation patterns at the top of the atmosphere. Averaged daily net radiation flows measured at the top of the atmosphere by the Earth Radiation Budget Experiment (ERBE). Units are W/m2. [Data for map courtesy of GSFC/NASA.]

Average daily net radiation flows tend to be
A) lowest in the midlatitudes (40° to 60° N/S).
B) equal at all latitudes.
C) positive at lower latitudes.
D) negative at lower latitudes
E) highest in the midlatitudes (40° to 60° N/S).
Answer: C
Diff: 2
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.3 Illustrate the interception of solar energy and its uneven distribution at the top of the atmosphere.

40) _____ refers to changes in daylength and the Sun's altitude over the course of the year.
A) Sphericity
B) Declination
C) Eccentricty
D) Parallelism
E) Seasonality
Answer: E
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

41) The Sun's altitude refers to
A) the angular distance from the equator to the latitude to the subsolar point.
B) the latitude of the subsolar point.
C) the angular height of the Sun above the horizon.
D) the distance of the sun from Earth.
E) the difference between the angles of insolation at the equator and the poles.
Answer: C
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

42) The Sun's declination refers to
A) the angular height of the Sun above the horizon.
B) the altitude, in thousands of feet, of the Sun above the horizon.
C) the difference between the angles of insolation at the equator and the poles.
D) the latitude of the subsolar point.
E) the distance of the sun from Earth.
Answer: D
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

43) The Sun's declination migrates through _____ of latitude annually.
A) 30°
B) 23.5°
C) 47°
D) 90°
E) 66.5°
Answer: C
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

44) Which of the following is correct regarding daylength?
A) The equator experiences 6 hours differences in daylength between summer and winter.
B) Day length is always 12 hours long at the equator.
C) Daylength is uniform at al latitudes throughout the year.
D) The range of daylength is shortest in the polar regions.
E) The poles always experience equal hours of day and night.
Answer: B
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

45) Which of the following is true of the number of hours of daylight?
A) The poles always experience equal hours of day and night.
B) Annually, the hours of daylight varies the least at higher latitudes.
C) The hours of daylight varies depending on the latitude of the observer.
D) Annually, the hours of daylight is constant at each latitude.
E) Annually, the hours of daylight varies the most along the equator.
Answer: C
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

46) Which of the following characterizes Earth's revolution?
A) The orbital shape is best described as circular.
B) It takes approximately 24 hours.
C) It determines the timing of seasons and length of the year.
D) It is responsible for creating the circle of illumination and, hence, day/night relationships.
E) The orbit has been constant since the formation of the Solar System.
Answer: C
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

47) Which of the following cannot be attributed to the effects of Earth's rotation?
A) latitudinal variations in net radiation
B) deflection of the ocean currents
C) daylength
D) rise and fall of the tides
E) deflection of the winds
Answer: A
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

48) As viewed from the equator, Earth's rotation is described as
A) east to west.
B) north to south.
C) counterclockwise.
D) west to east.
E) clockwise.
Answer: D
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

49) At all times during the year, the circle of illumination
A) divides Earth between Northern and Southern hemispheres.
B) divides between day and night.
C) divides Earth between Eastern and Western hemispheres.
D) separates winter from summer.
E) separates spring from autumn.
Answer: B
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

50) Which of the following is *not* true regarding rotational velocities at different latitudes?
A) At 0° latitude, the rotational velocity is 1675 kmph (1040 mph).
B) At 30° latitude, the rotational velocity is 1452 kmph (902 mph).
C) At 90° latitude, the rotational velocity is 1452 kmph (902 mph).
D) The linear velocity of rotation varies with latitude.
E) At 60° latitude, the rotational velocity is 838 kmph (521 mph).
Answer: C
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

51) Which of the following is *not* true?
A) The axial tilt ranges roughly between 22° and 24.5° over a 41,000 year cycle.
B) Earth's axis is tilted 23.5° relative to the plane of the ecliptic.
C) Throughout the year, Earth's axis maintains the same alignment relative to the plane of the ecliptic.
D) During the winter months, Earth's axis is aligned towards Southern Cross.
E) The axis through Earth's two poles points just slightly off Polaris.
Answer: D
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

52) The plane of Earth's orbit about the Sun is called
A) the great circle.
B) perihelion.
C) aphelion.
D) the subsolar point.
E) the plane of the ecliptic.
Answer: E
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

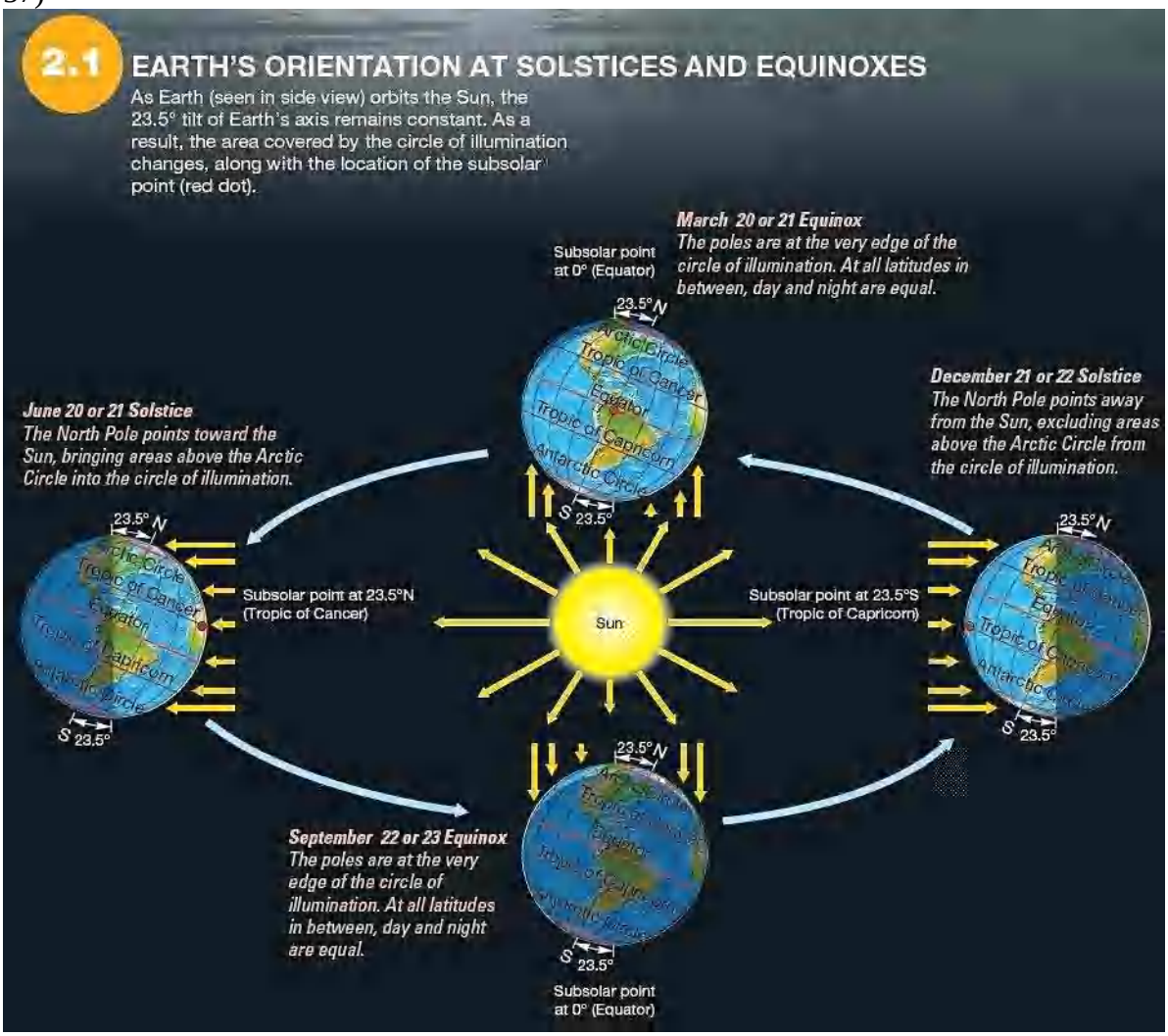
53) Axial parallelism refers to
A) the "wobble" of Earth on its axis during its annual revolution.
B) the curvature of Earth's surface relative to insolation.
C) the alignment of Earth's axis relative to the plane of ecliptic, Polaris, and other stars.
D) variations in the axial tilt over a 41,000 year period.
E) the "wobble" of Earth on its axis during its daily rotation.
Answer: C
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

54) Which of the following is *not* one of the reasons for Earth's seasonality?
A) the moon's rotation around Earth
B) Earth's sphericity
C) Earth's daily rotation on its axis
D) Earth's axial tilt
E) rotation of Earth around the Sun
Answer: A
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

55) The Tropic of Cancer refers to
A) 0° latitude when the Sun crosses the equator.
B) the location of the subsolar point on or around December 21.
C) the parallel that occurs at 23.5° South.
D) the parallel that is the farthest northern location of the subsolar point during the year.
E) the location of the subsolar point on or around September 22.
Answer: D
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

56) The Tropic of Capricorn refers to
A) the location of the subsolar point on or around September 22.
B) the parallel that is the farthest northern location of the subsolar point during the year.
C) the parallel that occurs at 66.5° South.
D) the location of the subsolar point on or around December 21.
E) the parallel that occurs at 23.5° South.
Answer: E
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

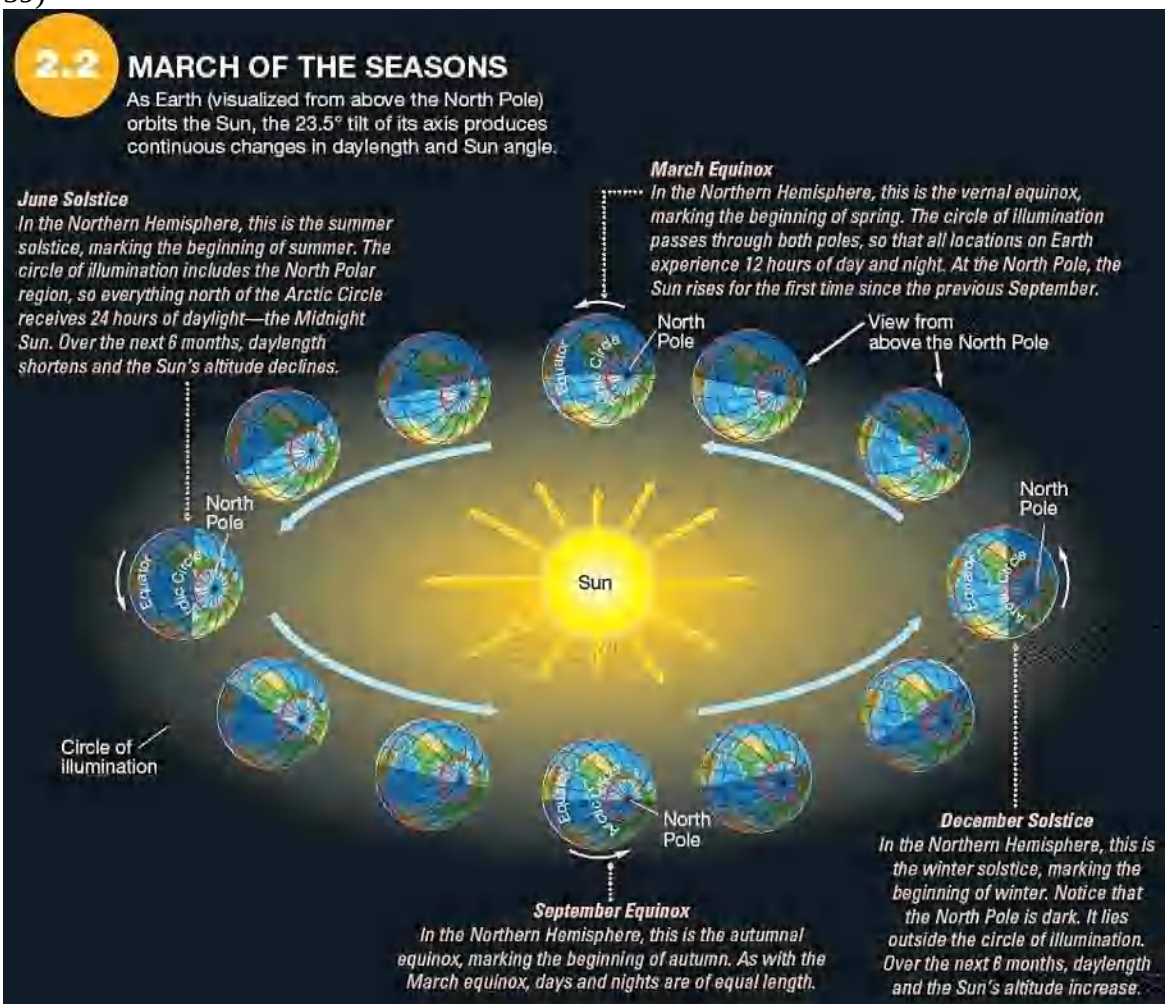
57)



Which is true of the December solstice?
A) The Arctic Circle is completely within the circle of illumination.
B) The subsolar point is at the Tropic of Cancer (23.5° N)
C) The subsolar point is at the equator.
D) The North Pole experiences 24 hours of daylight.
E) The Antarctic Circle is completely within the circle of illumination.
Answer: E
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

58) The Southern Hemisphere's summer solstice occurs
A) on or around June 21.
B) when the subsolar point is at the Tropic of Cancer.
C) on or around December 21.
D) at the same time as the Northern Hemisphere's summer solstice.
E) during the Northern Hemisphere's equinox.
Answer: C
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

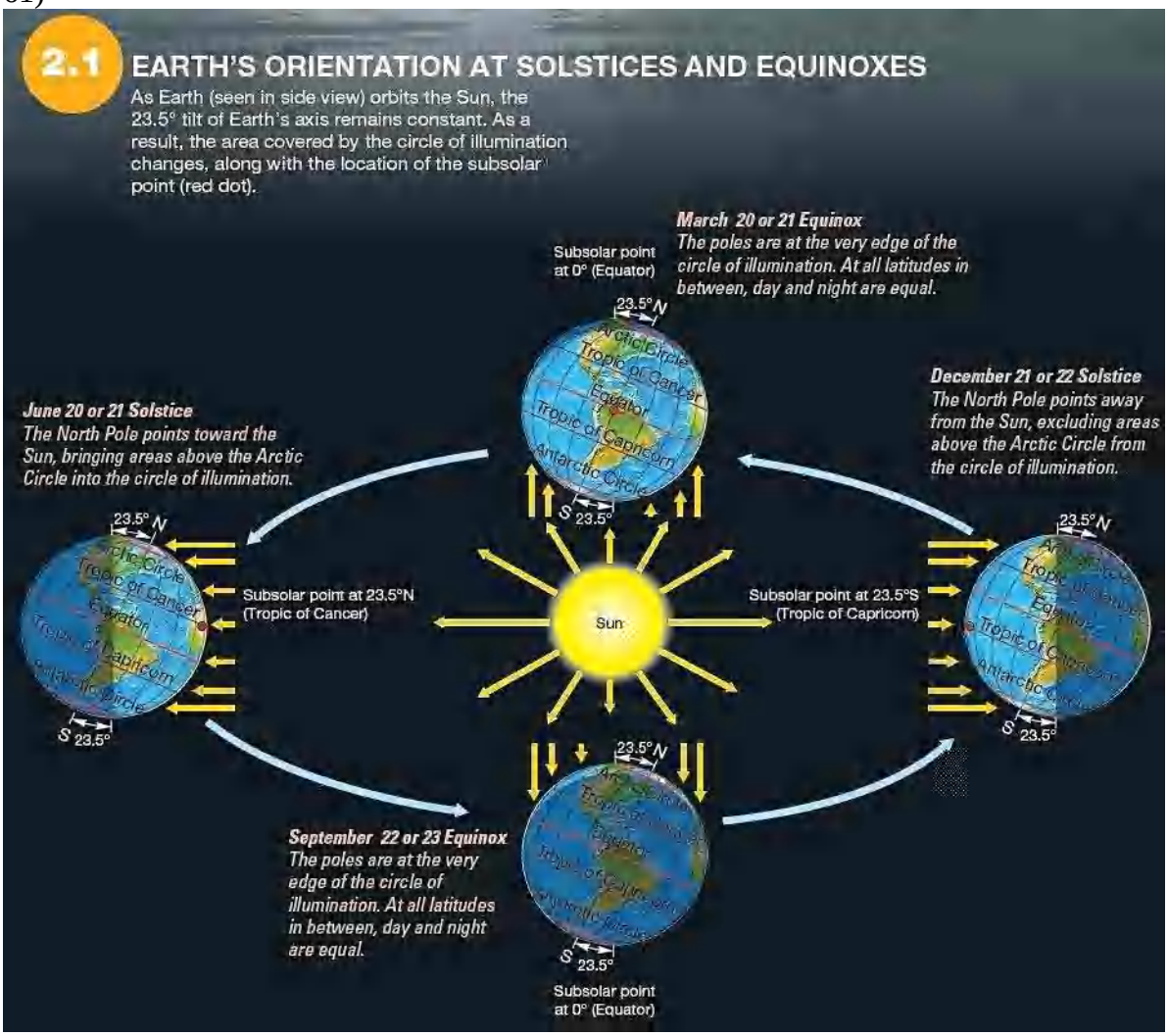
59)



Which is true of the March equinox?
A) The subsolar point is at the equator.
B) The subsolar point is at the South Pole.
C) The subsolar point is at the Tropic of Cancer (23.5° N).
D) The subsolar point is at the Tropic of Capricorn (23.5° S).
E) The subsolar point is at the North Pole.
Answer: A
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

60) On the March equinox
A) all latitudes on Earth except the equator experience unequal daylengths.
B) all latitudes between the poles experience equal daylength.
C) the Sun's direct rays strike perpendicular to the Tropic of Capricorn(23.5° S).
D) the subsolar point is at the South Pole.
E) the Arctic Circle is completely within the circle of illumination.
Answer: B
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

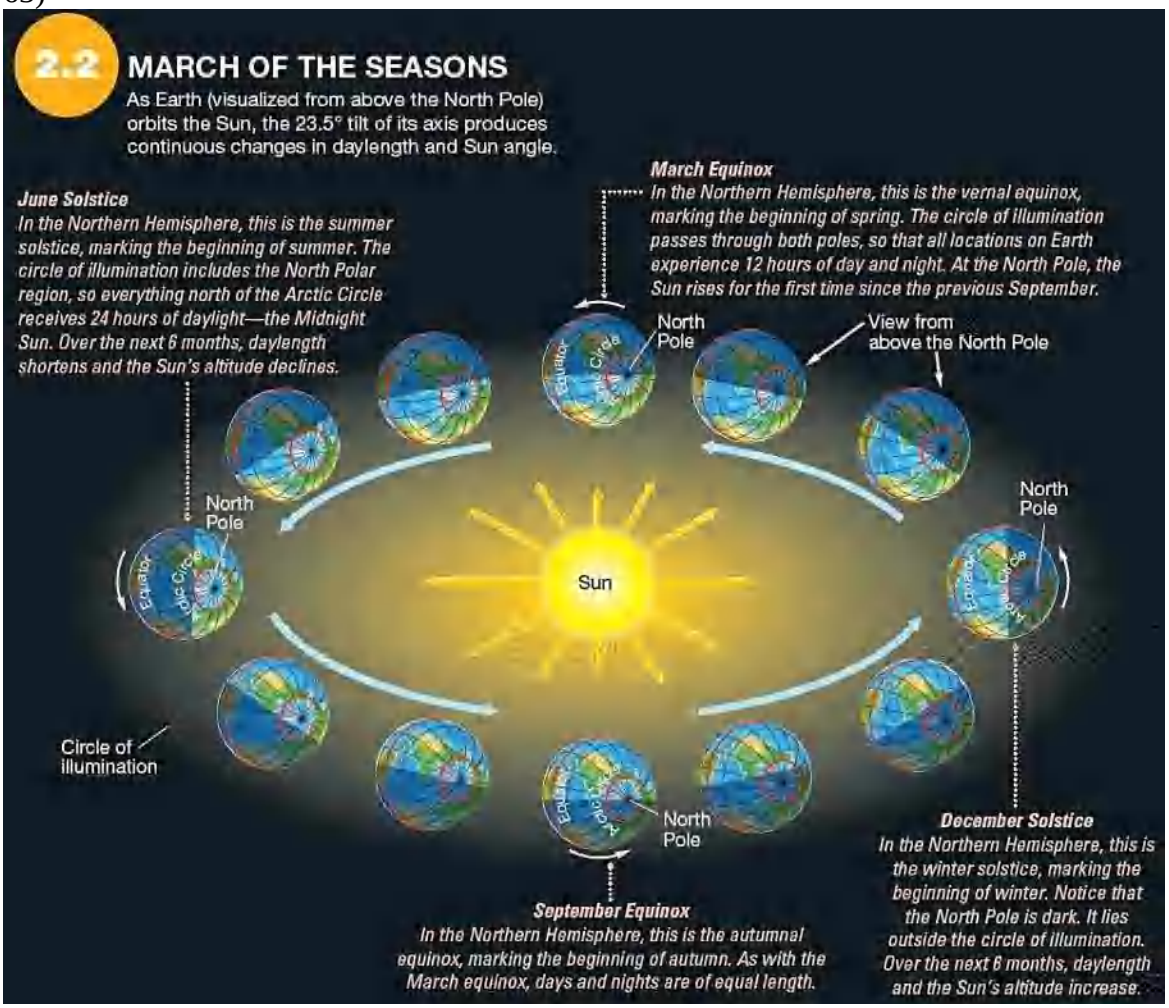
61)



Which is true of the June solstice?
A) The subsolar point is at the Tropic of Capricorn (23.5° N).
B) The Arctic Circle is completely within the circle of illumination.
C) The South Pole experiences 24 hours of daylight.
D) The Antarctic Circle is completely within the circle of illumination.
E) The subsolar point is at the equator.
Answer: B
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

62) One June 21st, the Sun's declination is at
A) the Tropic of Capricorn (23.5° S).
B) the Tropic of Cancer (23.5° S).
C) the equator.
D) the Arctic Circle.
E) the Antarctic Circle.
Answer: B
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

63)



Which is true of the September equinox?
A) The subsolar point is at the Tropic of Cancer (23.5° S).
B) There are 24 hours of daylight at the North Pole.
C) The circle of illumination passes through both poles.
D) The Antarctic Circle is completely within the circle of illumination.
E) The Arctic Circle is completely within the circle of illumination.
Answer: C
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

64) On the September Equinox
A) the subsolar point is at the Tropic of Cancer (23.5° S).
B) the sun rises at the South Pole and will remain over the horizon for the next six months.
C) the Arctic Circle is completely within the circle of illuminations and experiences 24 hours of daylength.
D) all latitudes on Earth except the equator experiences unequal daylengths.
E) the Northern Hemisphere's spring officially begins.
Answer: B
Diff: 1
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

65) What conditions would one expect to find in Quito, Ecuador, located at 0° 15' N, 78° 35' S?
A) Equal daylengths throughout the year.
B) The subsolar point directly overhead at noon on June 21st.
C) Long, dark winter nights.
D) 24 hours of darkness during the June Solstice.
E) The subsolar point directly overhead at noon on December 21st.
Answer: A
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

66) Which of the following statements is correct?
A) The Northern Hemisphere's vernal equinox is the Southern Hemisphere's summer equinox.
B) The Northern Hemisphere's vernal equinox is the Southern Hemisphere's autumnal equinox.
C) The Northern Hemisphere's vernal equinox is the Southern Hemisphere's winter solstice.
D) The Northern Hemisphere's vernal equinox is the Southern Hemisphere's vernal equinox.
E) The Northern Hemisphere's vernal equinox is the Southern Hemisphere's summer solstice.
Answer: B
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

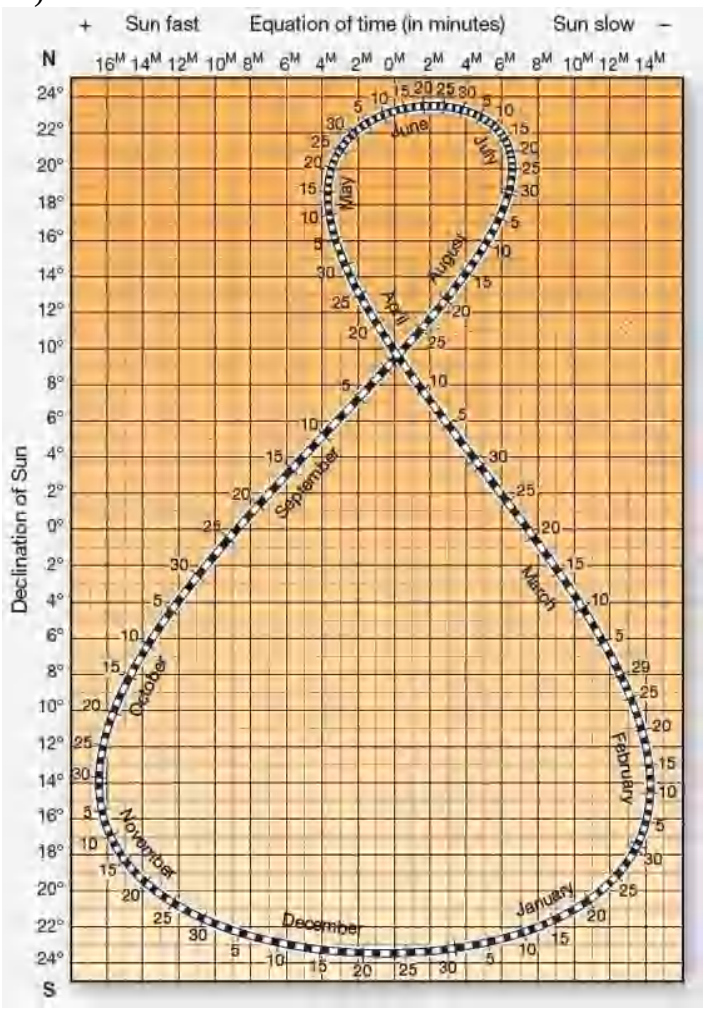
67) The equinox
A) has 12 hours of day and 12 hours of night for all locations.
B) occurs four times during the year.
C) is the longest day of the year at any given place.
D) occurs only in the Southern Hemisphere.
E) is when the subsolar point is at one of the tropics.
Answer: A
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

68) On June 21, the Sun never sets at Finn's location. Based on this, it can be concluded that Finn is currently
A) above the Arctic Circle.
B) between the Tropic of Cancer and Arctic Circle.
C) above the Antarctic Circle.
D) at the equator.
E) between the Tropic of Capricorn and the Antarctic Circle.
Answer: A
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

69) For observers in the Northern Hemisphere, which of the following is true?
A) Daylength decreases from the winter solstice until the vernal equinox, when it begins to increase.
B) Daylength becomes increasingly longer during the period from the summer solstice until the winter solstice.
C) The longest day of the year occurs on the December solstice.
D) Daylength variations are negligible for all locations throughout the year except above the Arctic Circle.
E) Daylength is longest on the summer solstice and is shortest on the winter solstice.
Answer: E
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

70) Which of the following relationships is incorrect?
A) June 21 — subsolar point at 23.5° N
B) December solstice — subsolar point at 23.5° S
C) September equinox — subsolar point at 23.5° S
D) June solstice — subsolar point at 23.5° N
E) March equinox — subsolar point at 0°
Answer: C
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

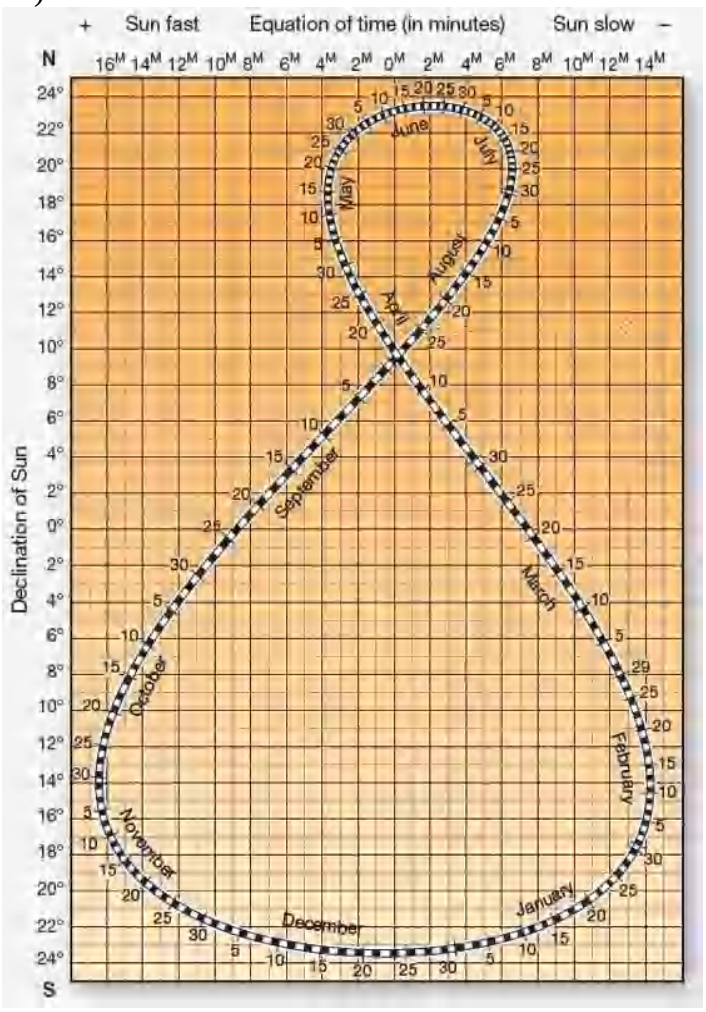
71)



The analemma chart

On approximately which dates is the subsolar point 16° S?
A) September 15 and March 30
B) March 30 and September 15
C) May 5 and August 10
D) April 25 and August 20
E) February 5 and November 5
Answer: E
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

72)



The analemma chart

The Sun passes directly overhead at 25° N _____ times a year?
A) 0
B) 1
C) 2
D) 3
E) 4
Answer: A
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Applying/Analyzing
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G3 Read and Interpret Graphs and Data.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

73) Which of the following is an example of humans influencing solar energy or seasonality?
A) Solar energy drives ecosystem processes that benefit humans.
B) Solar winds affect communication systems on the Earth.
C) Longer summers due to climate change have altered migration patterns of some animals.
D) Seasonal change determines the rhythm of life and food resources.
E) Shorter summers shorten the length of the growing season.
Answer: C
Diff: 2
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Remembering/Understanding
Geo Standard: N14 How human actions modify the physical environment.
Global Sci. LO: G7 Demonstrate the ability to make connections across Geography.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

74) What is a light-year? Why is the light-year a useful unit of measurement for astronomical distances?
Answer: A unit of measurement equivalent to the distance that light travels in 1 year. The speed of light is 300,000 kmps (186,000 mps). A light-year is, therefore, 9.5 trillion km/per year (6 trillion miles per year). Because the size of the universe is vast, the light-year is a useful unit of measurement for distances of such galactic scale.
Diff: 2
Chapter/Section: 2.1 The Solar System
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.1 Locate Earth in the Universe, describe the formation of our Solar System, and sketch Earth's orbital path around the Sun.

75) Describe Earth's orbit around the sun, discussing the orbital shape and Earth-Sun distance throughout the year.
Answer: Earth has an elliptical (oval) orbit around the sun. Earth's orbital speed average 107,280 kmph (66,660 mph). A full orbit around the Sun take 365.2422 days. Earth's average distance from the Sun is 150 million km (93 million mi.), so light reaches Earth from the Sun on average in 8 minutes 20 seconds. However, because the elliptical orbit shape, the distance between Earth and the Sun differs throughout the year. Earth is closest to the Sun on January 3, the perihelion. It is furthest from the sun on July 4, the aphelion.
Diff: 1
Chapter/Section: 2.1 The Solar System
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.1 Locate Earth in the Universe, describe the formation of our Solar System, and sketch Earth's orbital path around the Sun.

76) 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 (concentrated around 0.5 μm), while the Earth emits longwave radiation primarily in the thermal infrared wavelengths. More specifically, the Sun emits radiant energy composed of 8% ultraviolet, X-ray, and ray-wavelengths; 47% visible light wavelengths; and 45% infrared wavelengths. By contrast, Earth emits longer wavelengths, mostly in the infrared portion of the spectrum (centered around 10 μm).
Diff: 3
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.2 Describe the Sun's operation, and explain the solar wind and the electromagnetic spectrum of radiant energy.

77) Describe the causes and consequences of the uneven distribution of insolation, including a discussion of the thermopause, insolation, solar constant, subsolar point.
Answer: Due to the Earth's curved surface, lower latitudes receive more concentrated direct insolation, while higher latitudes receive less concentrated, more diffuse insolation. The only point where insolation arrives perpendicular to Earth's surface is called the subsolar point. During the course of a year, the subsolar point migrates 47°, between 23.5° N and 23.5° S. Within that latitudinal range, insolation is more concentrated. All other areas on Earth's surface receive insolation at angles less than 90°, resulting in more diffuse energy received. As a result, the equatorial region receives 2.5 times more annual insolation than the poles. This latitudinal in-balance in energy drives global circulation in the atmosphere and oceans. (Also, see figure 2.11 for additional guidance).
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.
Diff: 3
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.3 Illustrate the interception of solar energy and its uneven distribution at the top of the atmosphere.

78) What is global net radiation? Describe the latitudinal variations thereof.
Answer: Net radiation is the balance between incoming shortwave energy from the Sun and all outgoing radiation. Positive net radiation values are found at lower latitudes, while negative values are found at higher latitudes. Values are typically averaged based on daily values to show the global distribution thereof.
Diff: 3
Chapter/Section: 2.2 Solar Energy: From Sun to Earth
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.3 Illustrate the interception of solar energy and its uneven distribution at the top of the atmosphere.

79) What primary factors determine the seasons on Earth?
Answer: The five factors influencing seasonality are: Earth's revolution around the sun; the Earth's rotation on its axis; the Earth's axial tilt; axial parallelism; and the Earth's sphericity.
Revolution: Earth has an elliptical (oval) orbit around the sun. A full orbit around the Sun takes 365.2422 days.
Rotation: Earth completes a rotation on its axis every 24 hours (mostly). Rotation determines daylength, creates the apparent deflection of winds and ocean currents, and the twice-daily tides.
Axial tilt: Earth is tiled 23.5° relative to the plane of the ecliptic.
Axial parallelism: Earth's axis maintains the same alignment relative to the plane of the ecliptic throughout its orbit around the sun.
Sphericity: the roughly spherical shape of Earth causes the parallel rays of the sun to fall at different angles on Earth's surface.
Diff: 3
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

80) What is the circle of illumination and the importance thereof?
Answer: The circle of illumination if 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. Daylength at the equator is always evenly divided between 12 hours of day and 12 hours of night. Everywhere else on Earth, daylength varies (except on the equinoxes).
Diff: 3
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.4 Explain the concept of seasonality, and list the five reasons for Earth's seasons.

81) Explain the significance of each of the equinoxes and solstices.
Answer: The equinoxes mark the beginning of the spring and fall, all locations on the 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.
Diff: 3
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

82) How does daylength and the Sun's altitude vary throughout the year for the location in which you live?
Answer: Answers will vary depending on where students live. This website provides an easy way to calculate http://www.esrl.noaa.gov/gmd/grad/solcalc/.
Diff: 3
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

83) Discuss the differences in seasonality for the equatorial region and higher latitudes.
Answer: Because the equatorial region receives fairly constant high insolation and has consistent daylength throughout the year, there are little seasonal variations; at higher latitudes, insolation varies throughout the year (as does daylength), there are, therefore, greater seasonal variations.
Diff: 3
Chapter/Section: 2.3 The Seasons
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.

84) How might anthropogenic climate change affect seasonality?
Answer: There are several examples given in the book, but students can select others, as well. Seasonal shift 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.
Diff: 3
Chapter/Section: 2.4 The Human Denominator
Bloom's Taxonomy: Evaluating/Creating
Geo Standard: N7 The physical processes that shape the patterns of Earth's surface.
Global Sci. LO: G8 Communicate effectively in writing.
LO: 2.5 Describe the Earth-Sun relationships during the annual march of the seasons.