1. In which list are the forms of electromagnetic energy arranged in order from longest to shortest wavelengths?

   A) gamma rays, x-rays, ultraviolet rays, visible light
   B) radio waves, infrared rays, visible light, ultraviolet rays
   C) x-rays, infrared rays, blue light, gamma rays
   D) infrared rays, radio waves, blue light, red light

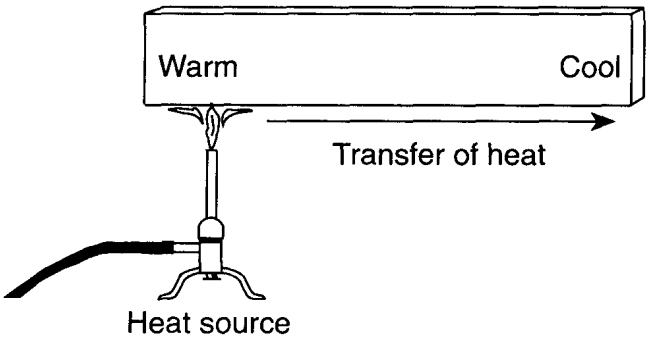
2. What is the basic difference between ultraviolet, visible, and infrared radiation?

   A) half-life B) temperature
   C) wavelength D) wave velocity

3. Energy is transferred from the Sun to Earth mainly by

   A) molecular collisions
   B) density currents
   C) electromagnetic waves
   D) red shifts

4. The diagram below shows a solid iron bar that is being heated in a flame.



   The primary method of heat transfer in the solid iron bar is

   A) convection **B) conduction**
   C) absorption D) advection

5. Heat energy from the lower latitudes is transferred to colder Earth regions by planetary wind circulation mainly through the process of

   A) conduction B) radiation
   C) convection D) reflection

6. By which process does starlight travel through space?

   A) absorption B) conduction
   C) convection **D) radiation**

7. Very cold climates occur at Earth's North and South Poles because the polar regions

   A) are usually farthest from the Sun
   B) absorb the greatest amount of insolation
   C) receive the most hours of daylight
   D) receive low-angle insolation

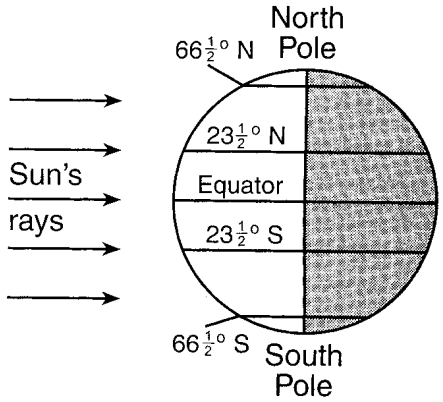
8. If Earth's axis were tilted *less* than 23.5°, which seasonal average temperature change would occur in New York State?

   A) Spring and fall would be cooler.
   B) Spring and fall would be warmer.
   C) Winter would be cooler.
   D) Summer would be cooler.

9. On which day of the year would the intensity of insolation at Kingston, New York, most likely be greatest?

   A) March 21 **B) June 21**
   C) September 23 D) December 21

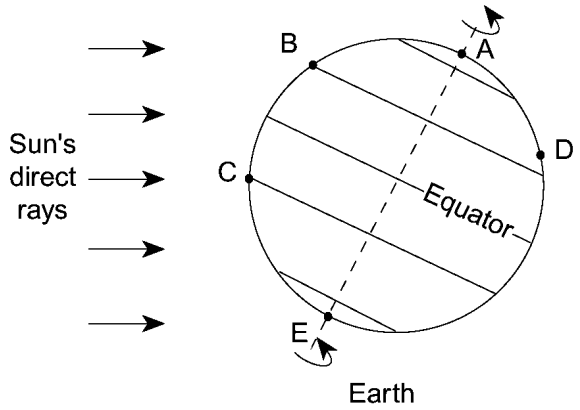
10. The diagram below represents Earth at a specific position in its orbit as viewed from space. The shaded area represents nighttime.



   Which Earth latitude receives the greatest intensity of insolation when Earth is at the position shown in the diagram?

   A) 0 B) $23\frac{1}{2}$°N
   C) $55\frac{1}{2}$°N D) 90°N

11. Base your answer to the following question on the diagram below, which shows the tilt of Earth on its axis in relation to the Sun on one particular day. Points *A* through *E* are locations on Earth's surface. Point *D* is located in Virginia. The dashed line represents Earth's axis.



What is the latitude of location *A*?

A) 0° B) $23\frac{1}{2}$° N C) $63\frac{1}{2}$° S **D) 90° N**

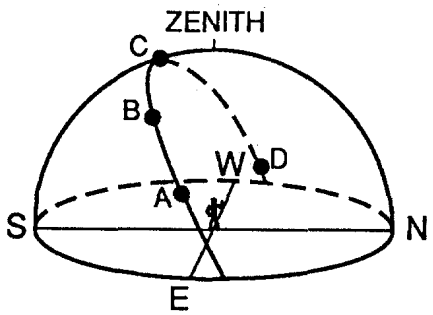
12. To an observer in Pennsylvania, the Sun appears to rise each day somewhere along the

A) northern horizon B) southern horizon
C) eastern horizon D) western horizon

13. Which angle of the Sun above the horizon produces the greatest intensity of sunlight?

A) 70° B) 60° C) 40° D) 25°

14. The diagram below shows the apparent path of the Sun for an observer in New York State.



For this observer, the intensity of insolation is *least* when the Sun is at point

A) *A* B) *B* C) *C* **D) *D***

15. At which latitude does the Earth receive the greatest intensity of insolation on June 21?

A) 0° B) $23\frac{1}{2}$° South
C) $23\frac{1}{2}$° North D) 90° North

16. On a given day, which factors have the most effect on the amount of insolation received at a location on the Earth's surface?

A) longitude and elevation
B) latitude and elevation
C) longitude and time of day
D) latitude and time of day

17. The amount of insolation reflected from the Earth's surface at a particular time is most dependent on the

A) angle of the Sun's rays
B) temperature of the Earth's surface
C) amount of nitrogen in the atmosphere
D) distance from the Earth to the Sun

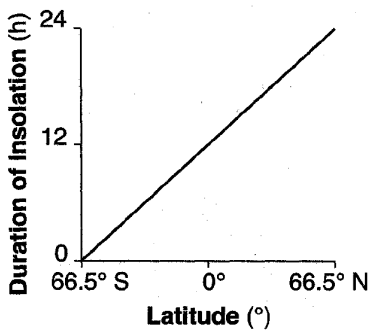
18. What happens to the angle of insolation on June 21 between solar noon and 6 p.m. in New York State?

A) It decreases steadily.
B) It increases steadily.
C) It remains the same.
D) It first increases and then decreases.

19. Compared to polar areas, why are equatorial areas of equal size heated much more intensely by the Sun?

A) The Sun's rays are more nearly perpendicular at the Equator than at the poles.
B) The equatorial areas contain more water than the polar areas do.
C) More hours of daylight occur at the Equator than at the poles.
D) The equatorial areas are nearer to the Sun than the polar areas are.

20. The graph below shows the general relationship between latitude and the duration of insolation on a particular day of the year.



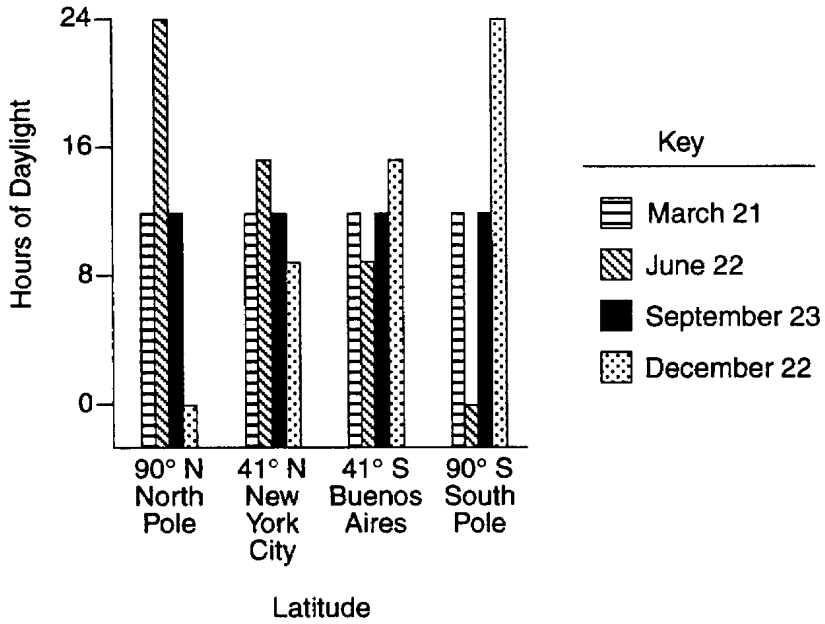
Which date is represented by the graph?

A) March 21 **B) June 21**
C) September 21 D) December 21

21. On June 21, some Earth locations have 24 hours of daylight. These locations are all between the latitudes of

A) 0° and $23\frac{1}{2}$° N B) $23\frac{1}{2}$° N and 47° N
C) 47° N and $66\frac{1}{2}$° N **D) $66\frac{1}{2}$°N and 90°N**

Base your answers to questions **22** through **25** on the graph below which represents the duration of insolation at four different latitudes on Earth on four different dates.



22. The total number of daylight hours during an entire year is

A) greatest at 41° N
B) greatest at 41° S
C) different at each of the four locations
D) the same at each of the four locations

23. At solar noon on June 22, the shadow of a vertical pole in Buenos Aires would point

A) northward
B) southward
C) eastward
D) westward

24. Buenos Aires, located at 41° S, receives the *shortest* duration of insolation on

A) March 21
B) June 22
C) September 23
D) December 22

25. On September 23, the duration of insolation at all four locations is 12 hours. The Sun is directly overhead at which latitude?

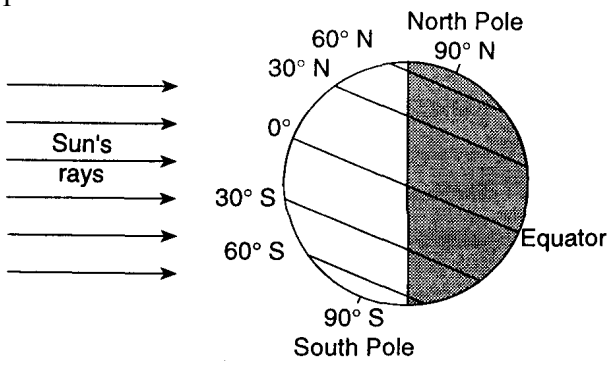
A) 0°
B) $23\frac{1}{2}$° N
C) $23\frac{1}{2}$° S
D) 90° N

---

26. In Maine, which day has the shortest duration of insolation?

A) March 21
B) June 21
C) June 21
D) December 21

27. The diagram below shows Earth as viewed from space on December 21.



The longest duration of insolation on December 21 will occur at

A) 90° N B) 30° N
C) 30° S **D) 90° S**

28. In the middle latitudes of the Southern Hemisphere, the warmest month is usually

A) February B) July
C) April D) October

29. In New York State, the number of hours of daylight each day increases continuously from

A) March 1 to May 1
B) June 1 to August 1
C) September 1 to November 1
D) December 1 to February 1

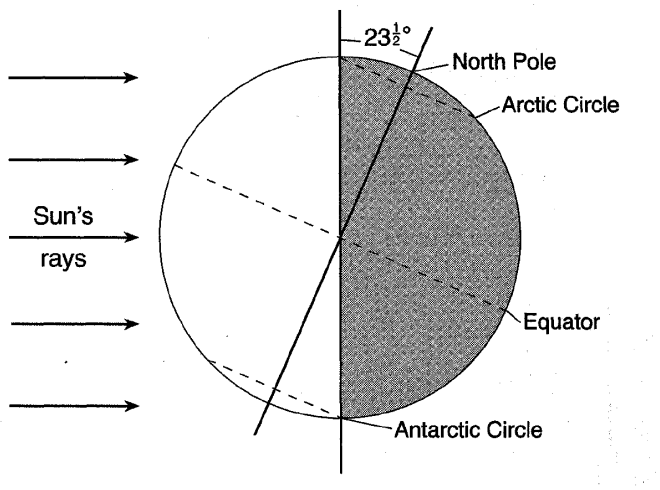
30. Which two factors determine the number of hours of daylight at a particular location?

A) longitude and season
B) longitude and the Earth's average diameter
C) latitude and season
D) latitude and the Earth's average diameter

31. On which day of the year does the Sun reach the greatest altitude at solar noon in New York City?

A) June 21 B) July 21
C) August 21 D) September 21

32. The diagram below shows Earth as viewed from space.



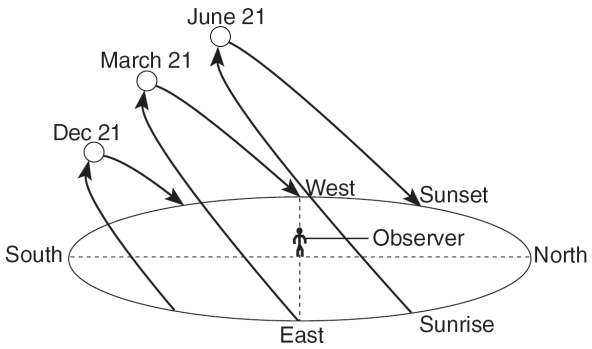
Which season is beginning in the Northern Hemisphere?

A) spring B) summer
C) fall **D) winter**

33. At which latitude is the Sun directly overhead on certain days of the year?

A) 23.5° N B) 42° N
C) 66.5° N D) 90° N

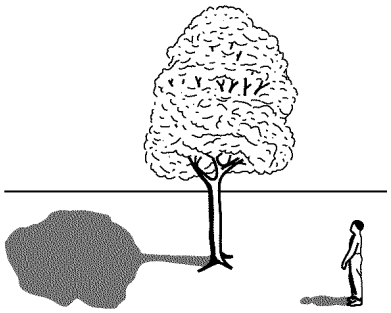
34. The diagram below shows the apparent daily path of the Sun, as viewed by an observer at a certain latitude on three different days of the year.



At which latitude were these apparent Sun paths most likely observed?

A) 0° B) 23.5° N
C) 43° N D) 66.5° N

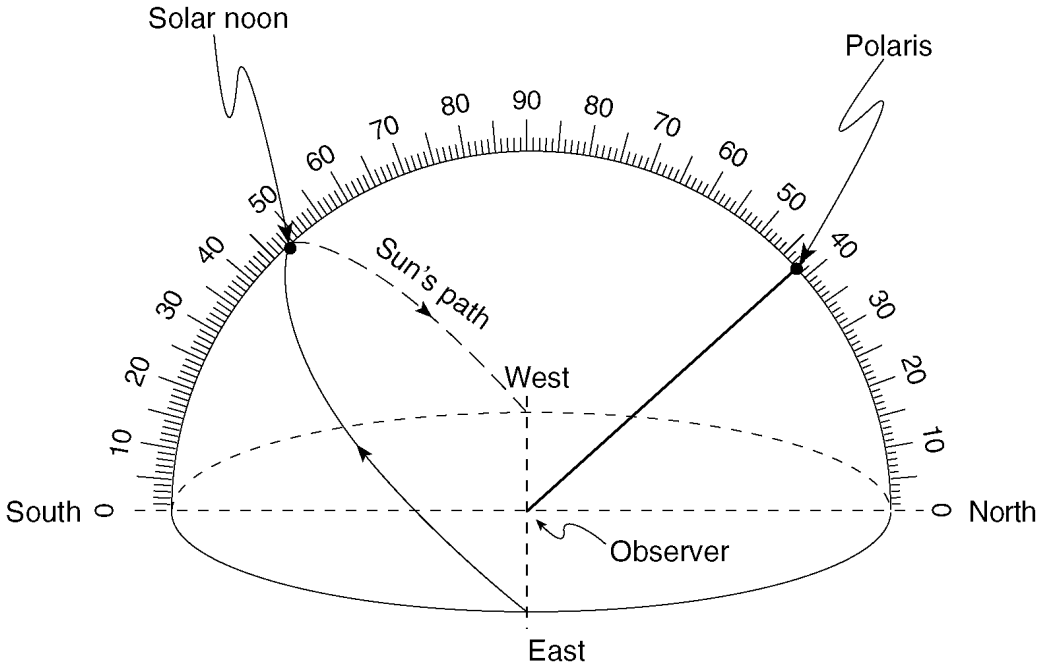
35. The diagram below shows the noontime shadows cast by a student and a tree.



If the time is solar noon and the student is located in New York State, in what direction is the student facing?

A) north B) south
C) east D) west

Base your answers to questions **36** and **37** on the diagram below, which represents a model of the sky (celestial sphere) for an observer in New York State. The curved arrow represents the Sun's apparent path for part of one day. The altitude of *Polaris* is also indicated.



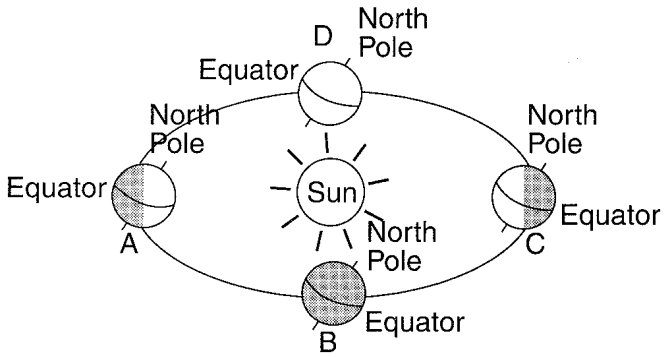
36. On which date could this observation of the Sun's apparent path have been made?

A) March 21 B) July 21 C) October 21 D) December 21

37. Where is this observer most likely located?

A) Massena B) Oswego
C) Slide Mountain D) Mt. Marcy

38. The diagram below represents Earth at four different positions, *A, B, C,* and *D,* in its orbit around the Sun.



(Not drawn to scale)

Between which positions would Texas be experiencing the summer season?

A) *A* and *B*
B) *B* and *C*
C) *C* and *D*
D) *D* and *A*

39. The apparent daily path of the Sun changes with the seasons because

A) Earth's axis is tilted
B) Earth's distance from the Sun changes
C) the Sun revolves
D) the Sun rotates

40. The *lowest* surface air temperatures in the Southern Hemisphere usually occur during the month of

A) January
B) April
C) July
D) October

Answer Key
Insolation

1.	**B**	36.	**A**
2.	**C**	37.	**C**
3.	**C**	38.	**A**
4.	**B**	39.	**A**
5.	**C**	40.	**C**
6.	**D**		
7.	**D**		
8.	**D**		
9.	**B**		
10.	**A**		
11.	**D**		
12.	**C**		
13.	**A**		
14.	**D**		
15.	**C**		
16.	**D**		
17.	**A**		
18.	**A**		
19.	**A**		
20.	**B**		
21.	**D**		
22.	**D**		
23.	**B**		
24.	**B**		
25.	**A**		
26.	**D**		
27.	**D**		
28.	**A**		
29.	**A**		
30.	**C**		
31.	**A**		
32.	**D**		
33.	**A**		
34.	**C**		
35.	**A**		