
Reference Tables for Physical Setting/EARTH SCIENCE

KEEP

CALM

AND USE

YOUR

ESRT

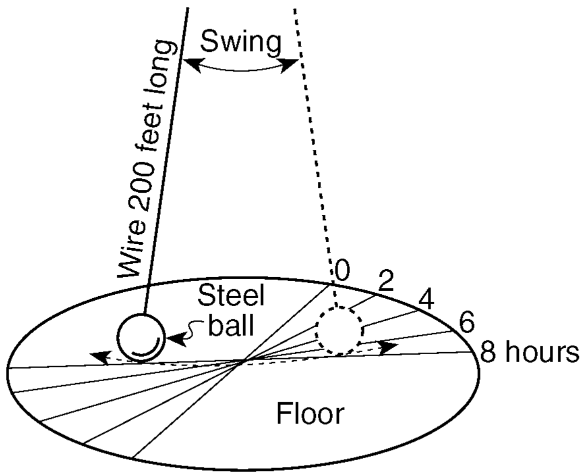
PLAINEDGE MIDDLE SCHOOL — SESSION 3: ***<u>Sun's Path</u>***

EARTH SCIENCE REGENTS REVIEW — Name: ___________________________________

1. The Foucault pendulum and the Coriolis effect both provide evidence of Earth's

A) revolution B) rotation
C) tilted axis D) elliptical orbit

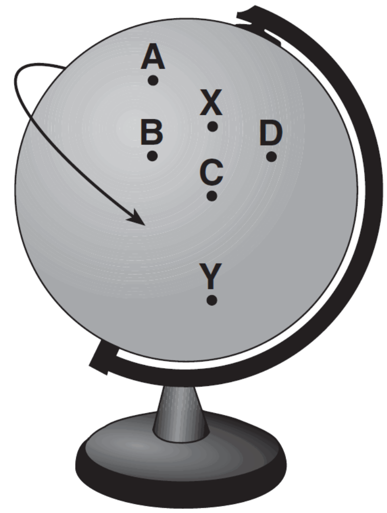
2. The diagram below represents a Foucault pendulum swinging freely for 8 hours.



The Foucault pendulum appears to gradually change its direction of swing due to Earth's

A) orbit around the Sun
B) curved surface
C) tilted axis
D) spin on its axis

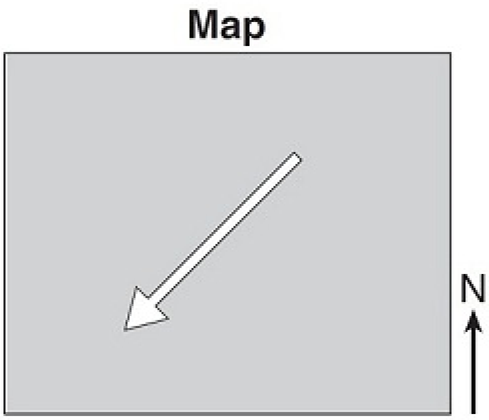
3. The diagram below represents a globe that is spinning to represent Earth rotating. The globe is spinning in the direction indicated by the arrow. Points *A, B, C, D, X,* and *Y* are locations on the globe.



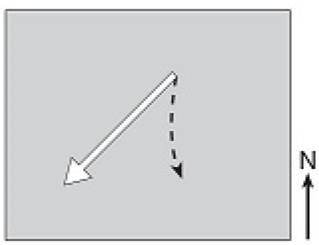
A student attempted to draw a straight line from point *X* to point *Y* on the spinning globe. Due to the Coriolis effect, the student's drawn line most likely passed through point

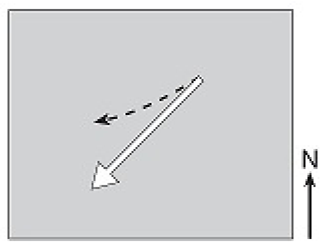
A) *A* B) *B* C) *C* D) *D*

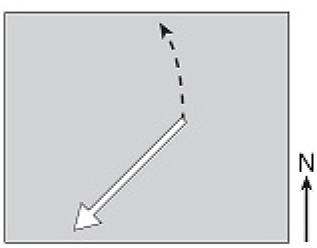
4. The arrow on the map below represents the direction a wind is blowing over a land surface in the Northern Hemisphere *without* showing the Coriolis effect.

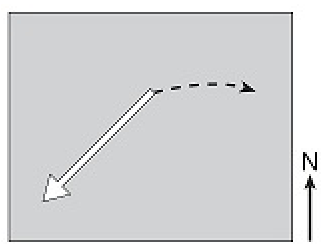


Which dashed arrow represents how the wind direction will change in the Northern Hemisphere due to the Coriolis effect?

A) 

B) 

C) 

D) 

5. Base your answer to the following question on the passage and data table below and on your knowledge of Earth science. The data table shows the apparent hourly change in the direction of a pendulum's swing, in degrees per hour (0 /h), for six different Northern Hemisphere latitudes.

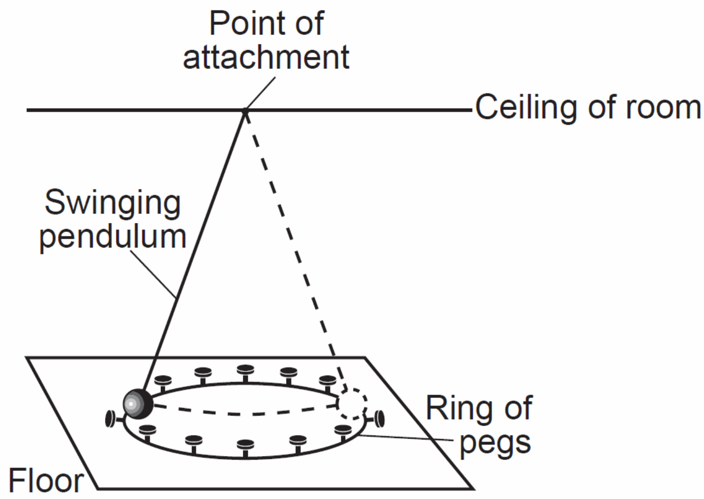
Foucault's Pendulum

In 1851, Jean-Bernard-Leon Foucault attached a heavy iron ball to a steel wire hanging from the high ceiling of a church in Paris to demonstrate an apparent motion caused by Earth's rotation. This pendulum could swing freely back and forth. A spike on the bottom of Foucault's pendulum produced straight lines in sand spread on the floor. The position of each new line appeared to gradually shift in a clockwise direction. Eventually, the pendulum returned to its original path, completing a 360° pattern in approximately 32 hours. At other northern latitudes, a Foucault pendulum will complete a 360° pattern of swing in different amounts of time. In the Northern Hemisphere, the number of degrees that a pendulum appears to change its clockwise direction of swing each hour varies with latitude.

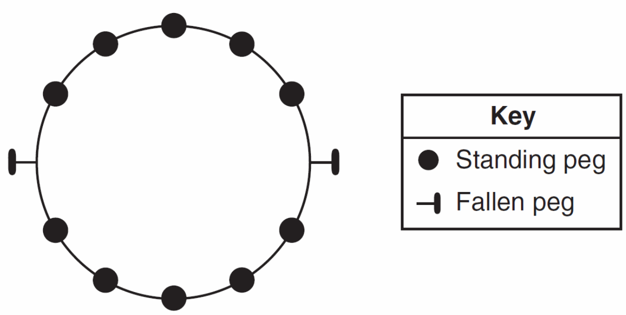
Data Table

Latitude (°N)	ApparentRateofChange intheDirectionofSwing (°/h)
15	3.9
30	7.5
45	10.6
60	13.0
75	14.5
90	15.0

The diagram below represents a swinging pendulum located in Earth's Northern Hemisphere. The pendulum knocked over two pegs during its first swing.



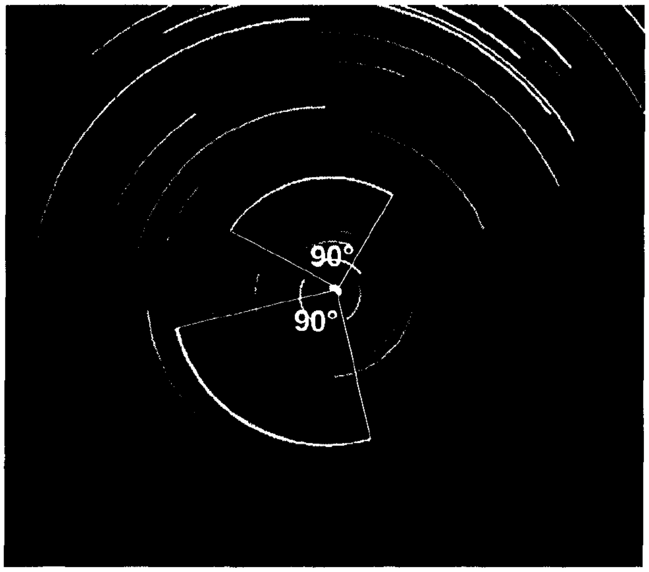
The diagram represents a top view of the same pegs. Circle the next *two* pegs that would fall as the pendulum appears to change its direction of swing in the Northern Hemisphere.



6. To a nighttime observer on Earth, how many degrees do the stars appear to move around *Polaris* in 3 hours?

A) 60° B) 45° C) 3° D) 15º

7. A camera was placed in an open field and pointed toward the northern sky. The lens of the camera was left open for a certain amount of time. The result is shown in the photograph below. The angle of the arc through which two of the stars appeared to move during this time exposure is shown.



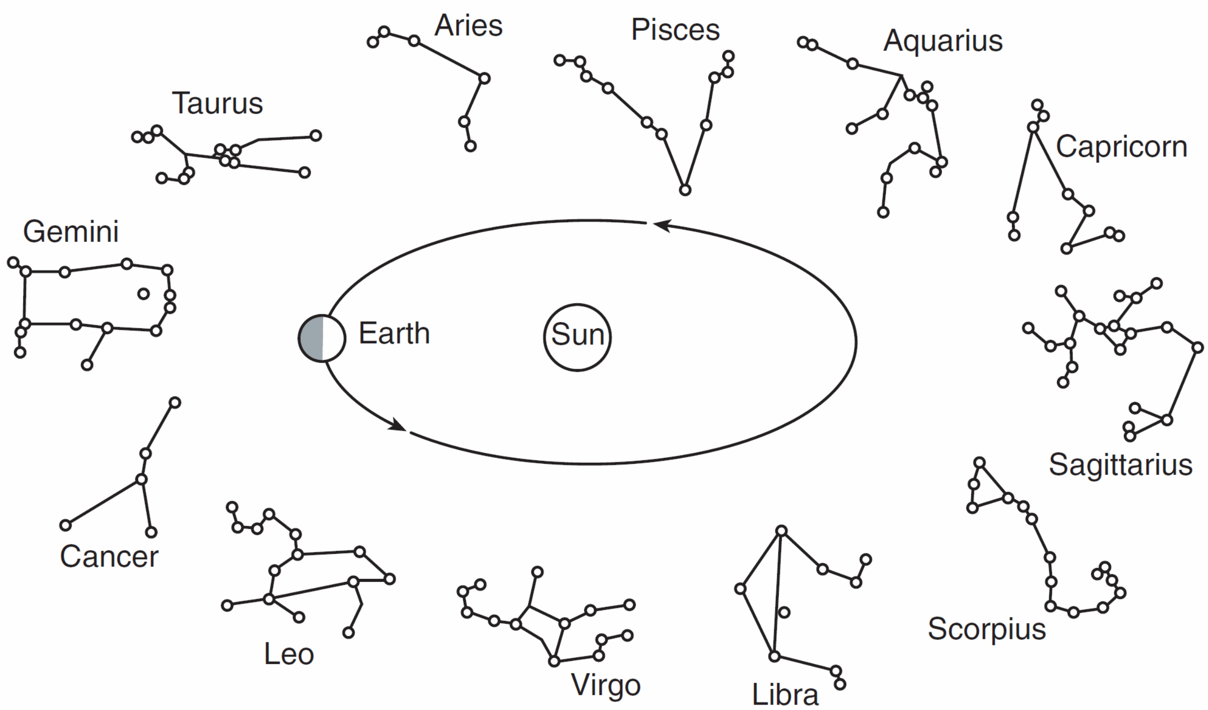
How many hours was the lens left open to produce the photograph?

A) 12 B) 2 C) 6 D) 4

8. Which statement best explains the apparent daily motion of the stars around *Polaris*?

A) The Earth's orbit is an ellipse.
B) The Earth has the shape of an oblate spheroid.
C) The Earth rotates on its axis.
D) The Earth revolves around the Sun.

9. The diagram below represents some constellations and one position of Earth in its orbit around the Sun. These constellations are visible to an observer on Earth at different times of the year.



(Not drawn to scale)

When Earth is located in the orbital position shown, two constellations that are both visible to an observer on Earth at midnight are

A) Libra and Virgo
B) Gemini and Taurus
C) Aquarius and Capricorn
D) Cancer and Sagittarius

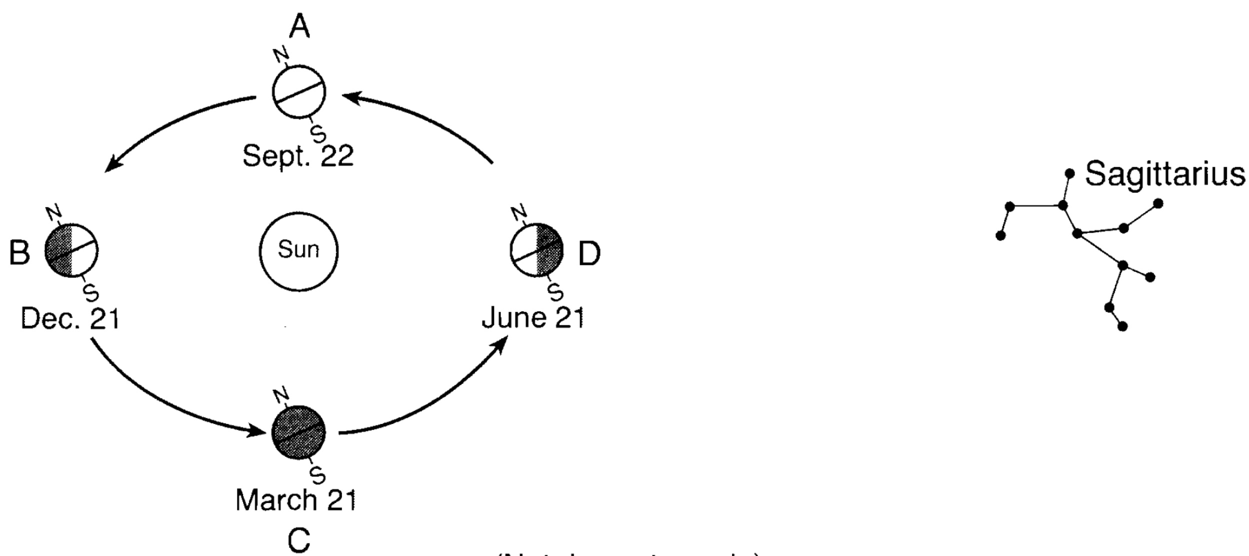
10. Base your answer to the following question on the data table below and on your knowledge of Earth Science. The data table shows some constellations that can be seen by an observer in New York State during different seasons.

Season	Constellations
spring	Ursa Minor, Orion, Leo, Scorpius
summer	Ursa Minor, Leo, Scorpius, Aquarius
fall	Ursa Minor, Orion, Scorpius, Aquarius
winter	Ursa Minor, Orion, Leo, Aquarius

Which statement best explains why some constellations are *not* seen during all four seasons?

A) Earth revolves around the Sun.
B) Constellations revolve around the Sun.
C) The Moon revolves around Earth.
D) The Sun revolves around the center of the Milky Way.

11. Base your answer to the following question on the diagram of the Sun, Earth, and the constellation Sagittarius shown below. Positions *A* through *D* show Earth in its orbit around the Sun on the first day of each season. Sagittarius is represented in its position in space relative to Earth's orbit.



(Not drawn to scale)

At which lettered position does Sagittarius appear highest in the sky at midnight to observers near Earth's equator?

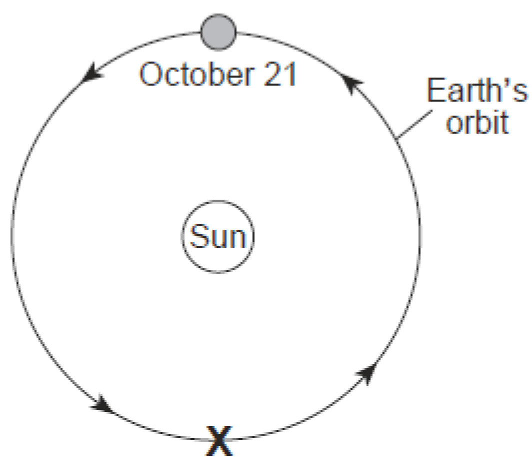
12. In New York State, the constellation Pisces can be seen in the night sky between the middle of summer and the middle of winter. The constellation Scorpio can be seen in the night sky between early spring and early fall. The reason these two constellations can be viewed only at these times is a direct result of Earth's

A) spin on its axis
B) movement around the Sun
C) axis having a 23.5° tilt
D) distance from the Sun

13. Why do stars appear to move through the night sky at the rate of 15 degrees per hour?

A) The Earth actually moves around the Sun at a rate of 15° per hour.
B) The stars actually move around the center of the galaxy at a rate of 15° per hour.
C) The Earth actually rotates at a rate of 15° per hour.
D) The stars actually revolve around the Earth at a rate of 15° per hour.

14. The diagram below represents the orbital position of Earth on October 21.



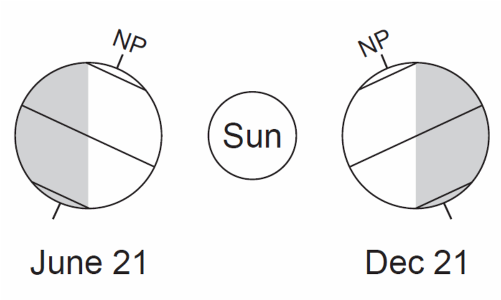
(Not drawn to scale)

Which Northern Hemisphere season is occurring when Earth reaches position *X*?

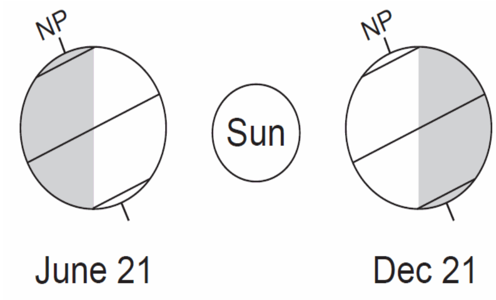
A) winter
B) spring
C) summer
D) fall

15. Which diagram best represents the regions of Earth in sunlight on June 21 and December 21? [NP indicates the North Pole and the shading represents Earth's night side. Diagrams are not drawn to scale.]

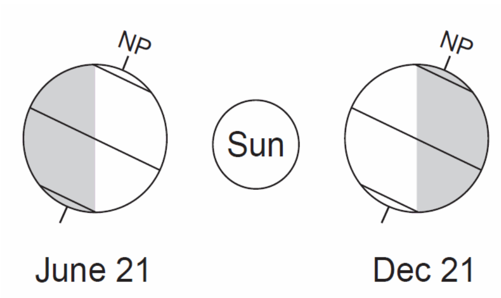
A)



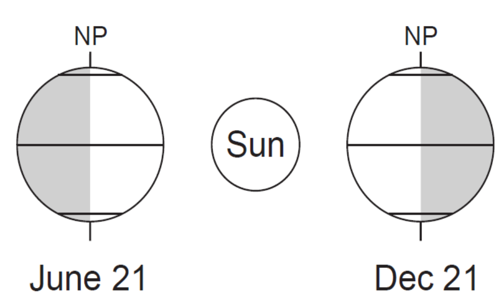
B)



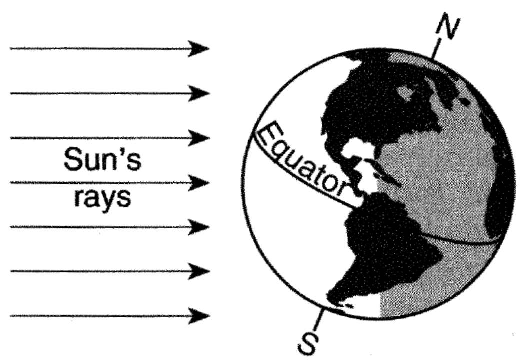
C)



D)



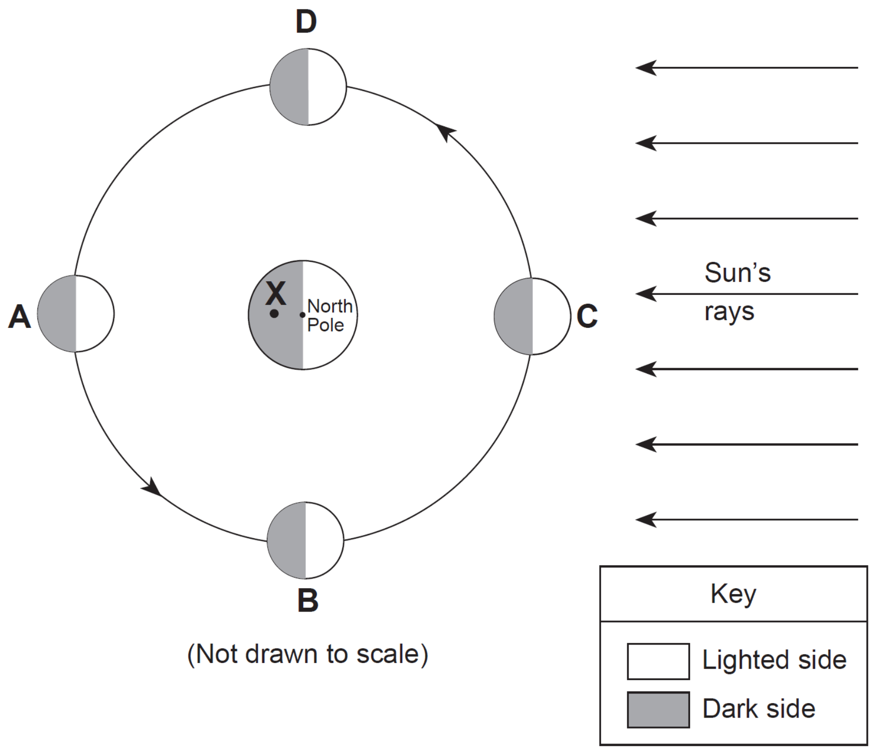
16. The diagram below represents Earth in space on the first day of a season.



Which season is beginning in New York State on the day represented in the diagram?

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

17. Base your answer to the following question on the diagram below, which shows Earth and the Moon in relation to the Sun. Positions *A*, *B*, *C*, and *D* show the Moon at specific locations in its orbit. Point *X* is a location on Earth's surface.

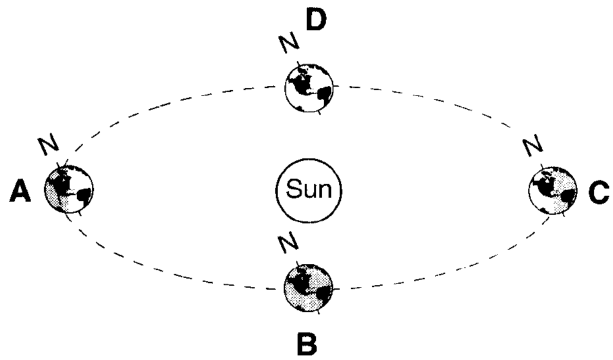


(Not drawn to scale)

On what date does the line separating day and night pass through Earth's North Pole, as shown in this diagram?

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

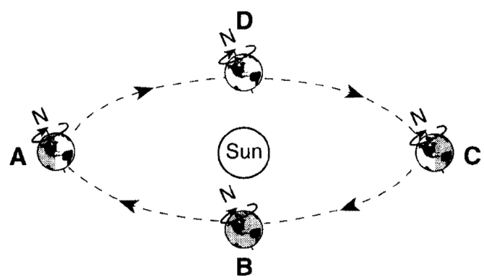
Base your answers to questions **18** and **19** on the diagram below, which represents Earth in its orbit around the Sun. The position of Earth on the first day of each season is labeled *A*, *B*, *C*, and *D*.



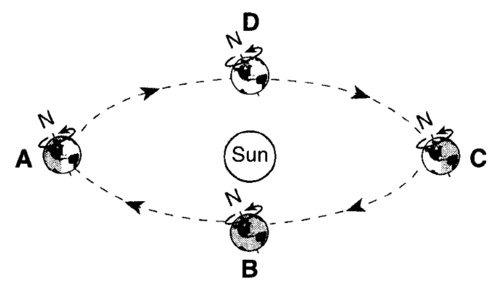
(Not drawn to scale)

18. Which diagram correctly shows the directions of Earth's revolution and rotation?

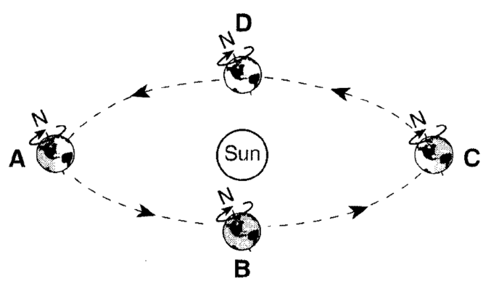
A)



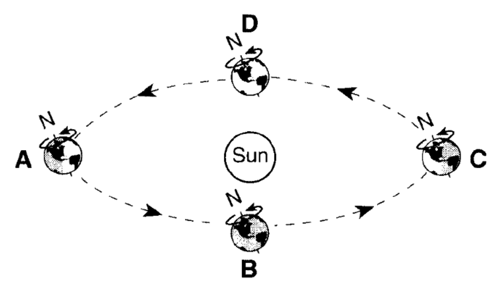
B)



C)



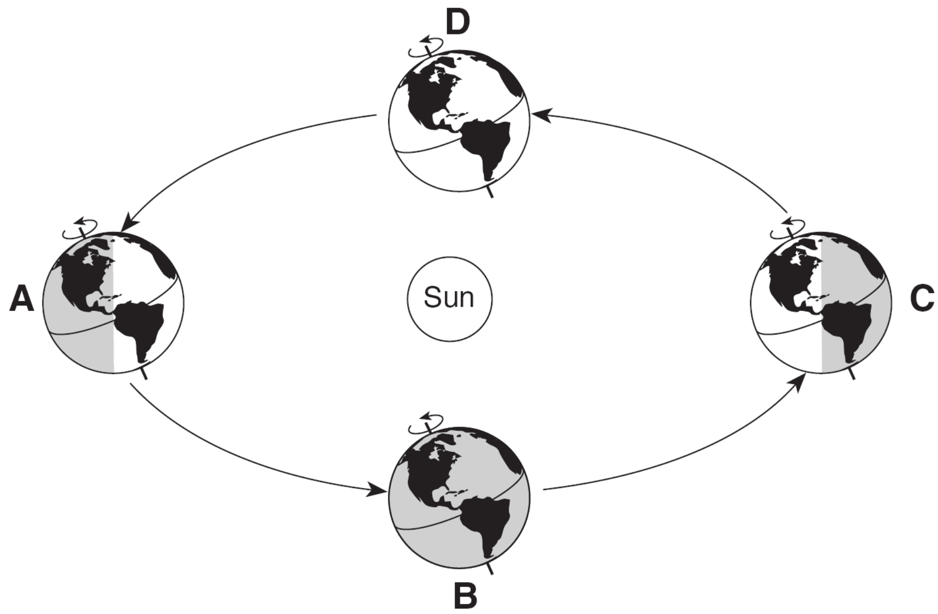
D)



19. What is the approximate rate of Earth's revolution around the Sun?

A) 1° per day B) 1° per year C) 15° per day D) 15° per year

20. Base your answer to the following question on the diagram below, which shows a model of Earth's orbit around the Sun. Letters *A*, *B*, *C*, and *D* represent Earth's position at the beginning of each season.

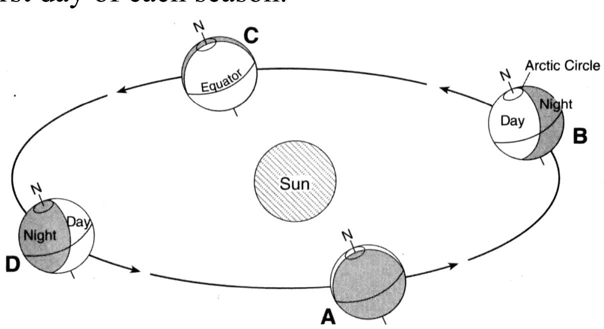


(Not drawn to scale)

How many degrees will the Sun's vertical rays shift on Earth's surface as Earth travels from position *C* to position *D*?

A) 15° B) 23.5° C) 47° D) 365°

21. The diagram below shows Earth's orbit around the Sun. Locations *A, B, C,* and *D* represent Earth on the first day of each season.

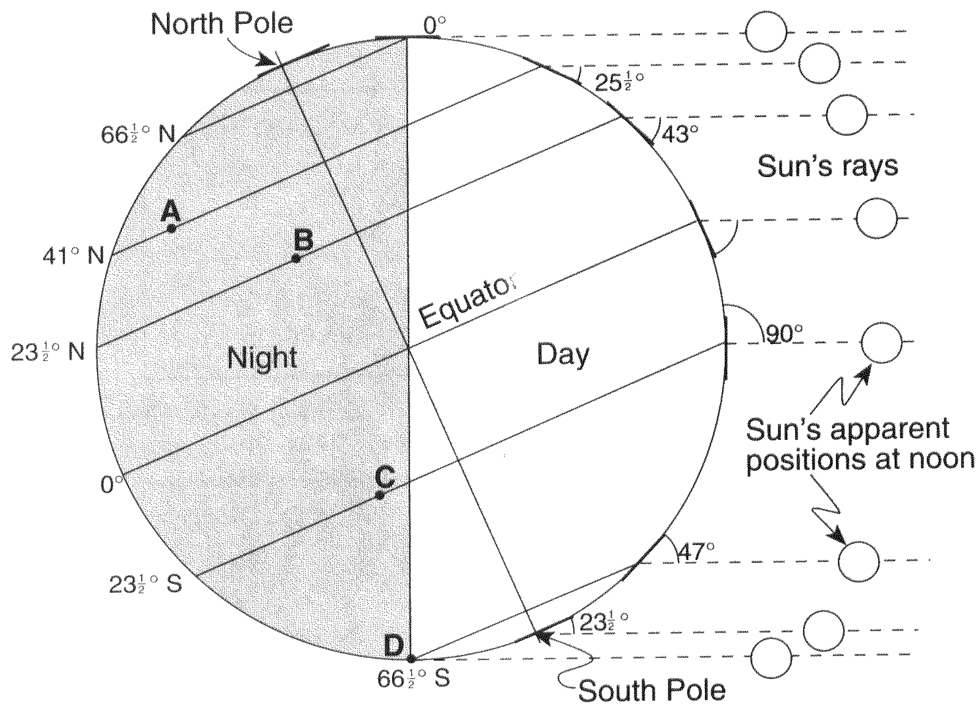


(Not drawn to scale)

Which location represents March 21?

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

22. Base your answer to the following question on the diagram below, which shows the altitude and apparent position of the noontime Sun, as seen from various latitudes on Earth on a particular day of the year. Letters *A* through *D* represent locations on Earth's surface.



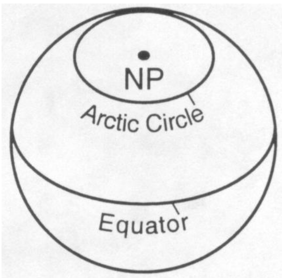
(Not drawn to scale)

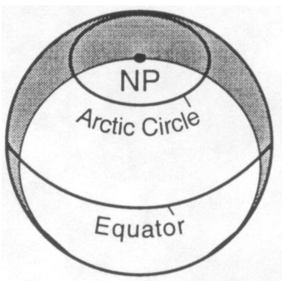
Which season will begin at 41° N latitude, three months after the date represented by this diagram?

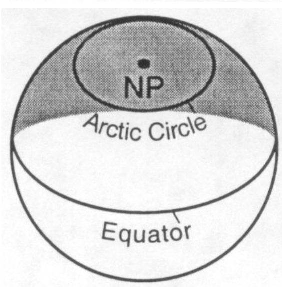
A) summer B) fall C) winter D) spring

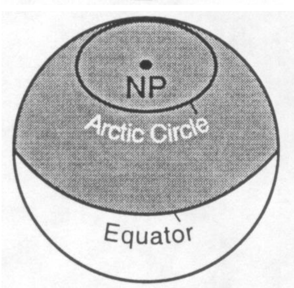
23. Which diagram most correctly shows the portion of Earth that is illuminated by sunlight and the portion that is in shadow on the first day of summer in the Northern Hemisphere?

[Key: ☐ = illuminated, ▒ = shadow, NP = North Pole]

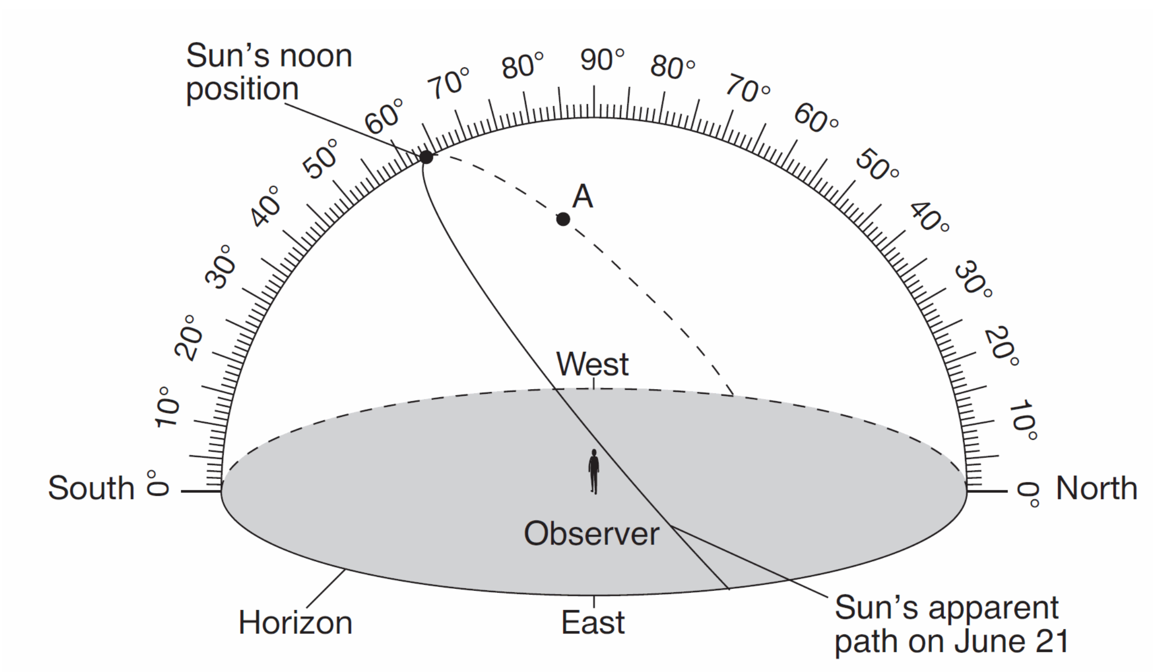
A) 

B) 

C) 

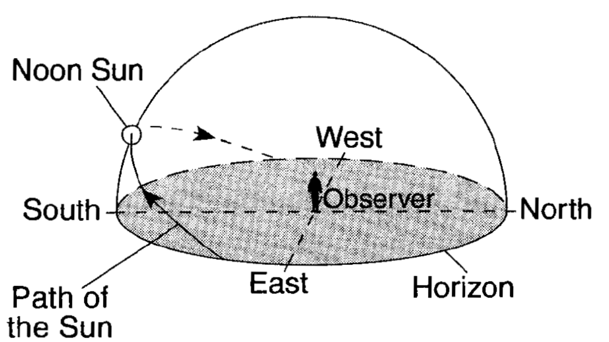
D) 

24. Base your answer to the following question on the diagram in your answer booklet and on your knowledge of Earth science. The diagram is a model of the sky (celestial sphere) for an observer at 50° N latitude. The Sun's apparent path on June 21 is shown. Point *A* is a position along the Sun's apparent path. Angular distances above the horizon are indicated.



Using the diagram above, draw the December 21st path and the March 21st path on the dome. Be sure to label sunrise and sunset and the correct altitude of noon sun.

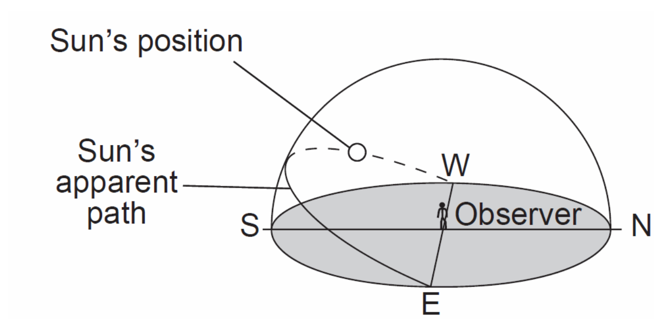
25. The model below shows the apparent path of the Sun as seen by an observer in New York State on the first day of one of the four seasons.



This apparent path of the Sun was observed on the first day of

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

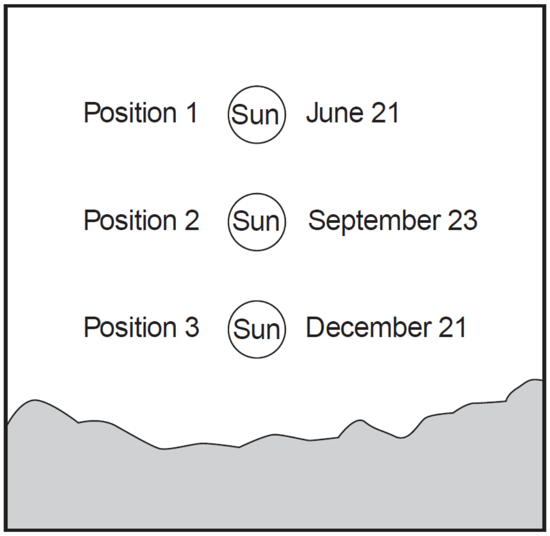
26. The diagram below represents the apparent path of the Sun as seen by an observer at 65° N on March 21.



The Sun's position shown in the diagram was observed closest to which time of day?

A) 9 a.m.
B) 11 a.m.
C) 3 p.m.
D) 6 p.m.

27. Positions 1, 2, and 3 in the diagram below represent the noon Sun above the horizon on three different days during the year, as viewed from Binghamton, New York.

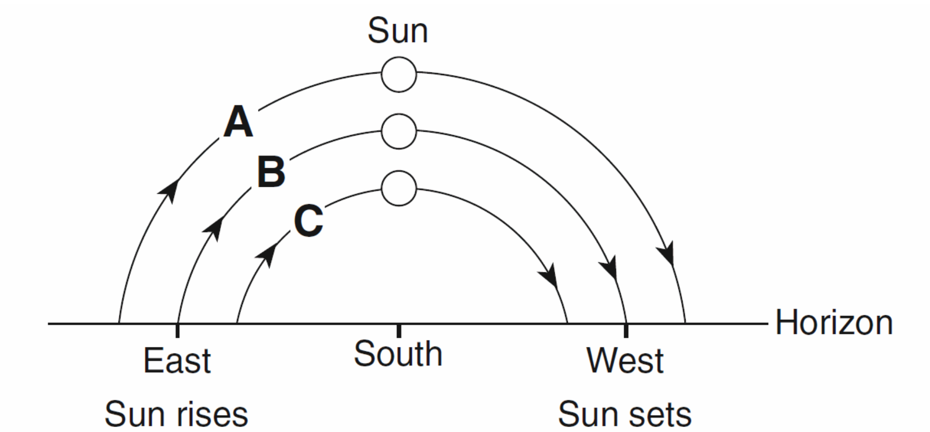


South
(Not drawn to scale)

At which position was the noon Sun on January 21, as viewed from Binghamton?

A) above position 1
B) below position 3
C) between position 1 and position 2
D) between position 2 and position 3

28. The diagram below represents the horizon and the Sun's apparent paths, *A*, *B*, and *C*, on three different dates, as viewed from the same location in New York State.



Which table correctly shows the dates on which the apparent paths of the Sun were observed?

A)

Path of Sun	Date
A	December 21
B	September 23
C	March 21

B)

Path of Sun	Date
A	December 21
B	March 21
C	June 21

C)

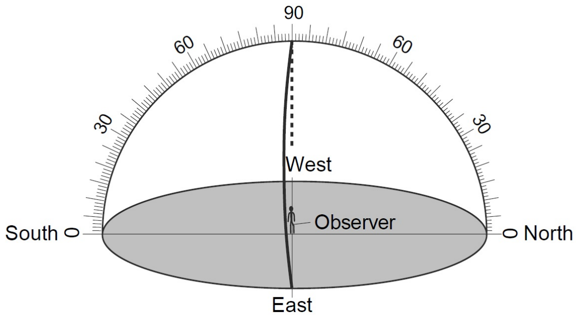
Path of Sun	Date
A	March 21
B	September 23
C	June 21

D)

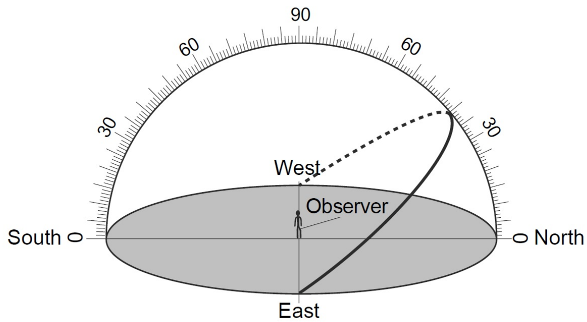
Path of Sun	Date
A	June 21
B	March 21
C	December 21

29. Which diagram represents the apparent path of the Sun on March 21 for an observer at the equator?

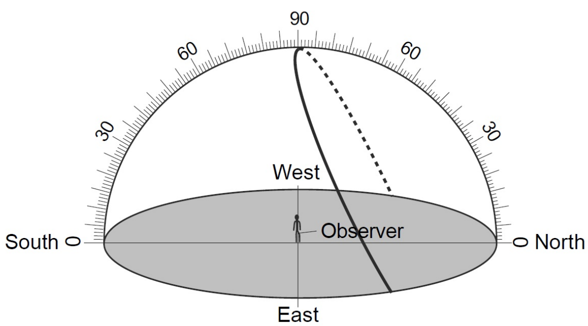
A)



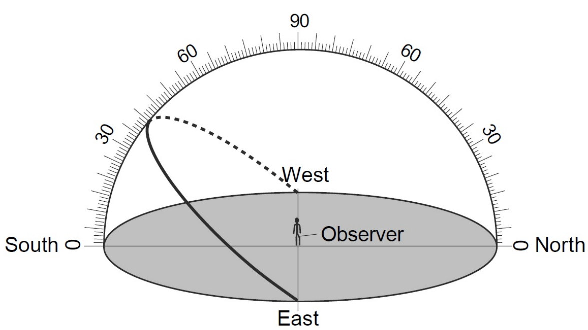
B)



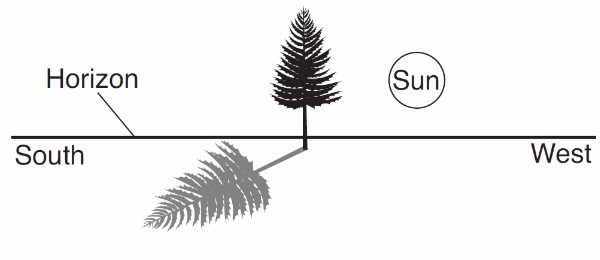
C)



D)



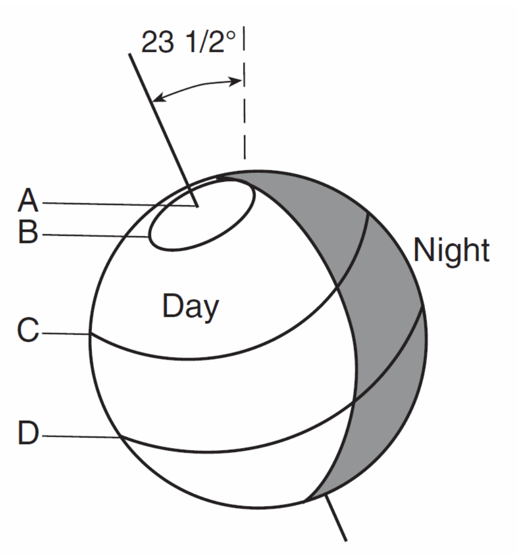
30. A tree in New York State casts a shadow as shown in the diagram below.



What time of day and season are represented by the diagram?

A) early morning in winter
B) early morning in summer
C) late afternoon in winter
D) late afternoon in summer

31. The diagram below indicates regions of daylight and darkness on Earth on the first day of summer in the Northern Hemisphere. Four latitudes are labeled *A, B, C,* and *D*.



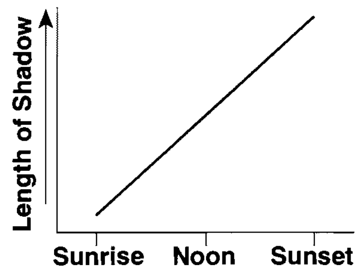
At which latitude is the Sun above the horizon for the *least* number of hours on the day shown?

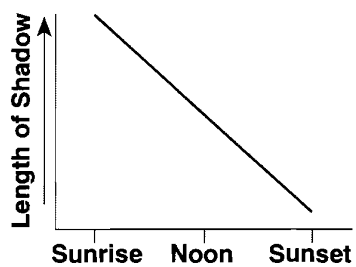
A) *A* B) *B* C) *C* D) *D*

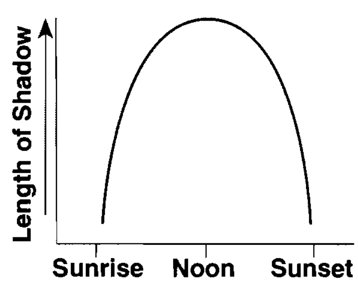
32. Equal areas of which surface will absorb the most insolation?

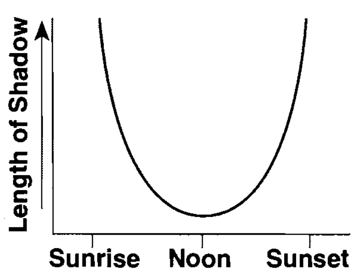
A) partially melted snowfield
B) blacktop parking lot
C) white sand beach
D) lake surface

33. Which graph best shows the length of a shadow cast from sunrise to sunset by a flagpole in New York State?

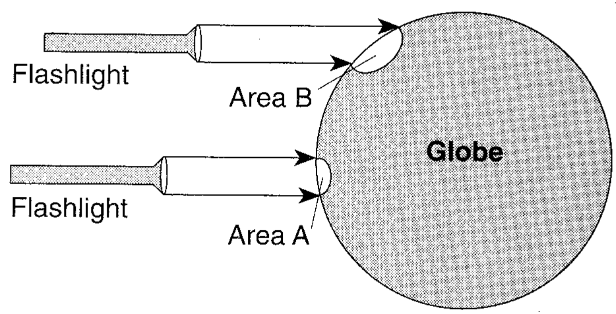
A)


B)


C)


D)


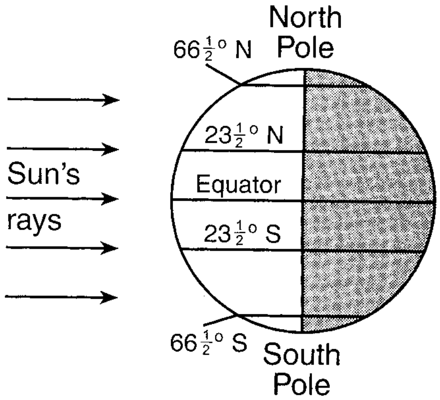
34. The diagram below shows a classroom demonstration. Two identical flashlights were placed in the positions shown and they illuminated areas of varying size, *A* and *B*, on a classroom globe. Thermometers were then placed at the center of each illuminated area to measure the rate of temperature increase. Readings were taken over a period of 30 minutes.



Students most likely observed that the temperature of area *A* increased at a

A) slower rate than the temperature of area *B* because area *A* received rays that were less concentrated
B) slower rate than the temperature of area *B* because area *A* received rays that were more slanted
C) faster rate than the temperature of area *B* because area *A* received rays that were more perpendicular to the surface
D) faster rate than the temperature of area *B* because area *A* received rays with less total energy

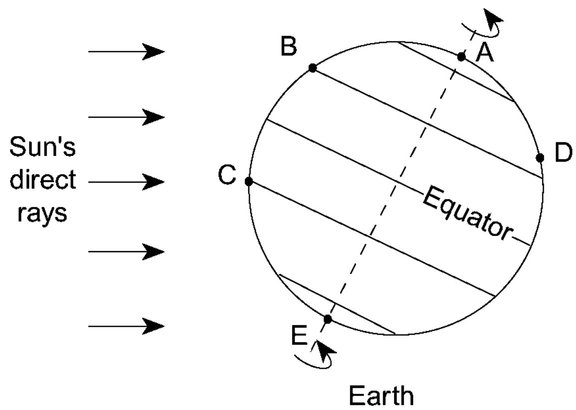
35. The diagram below represents Earth at a specific position in its orbit as viewed from space. The shaded area represents nighttime.



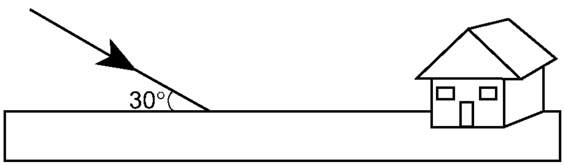
Which Earth latitude receives the greatest intensity of insolation when Earth is at the position shown in the diagram?

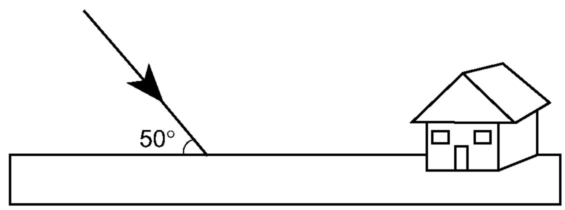
A) 0
B) $23\frac{1}{2}$°N
C) $55\frac{1}{2}$°N
D) 90°N

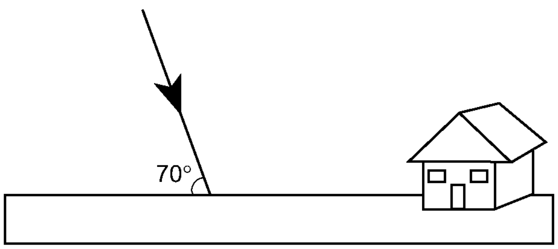
36. Base your answer to the following question on the diagram below, which shows the tilt of Earth on its axis in relation to the Sun on one particular day. Points *A* through *E* are locations on Earth's surface. Point *D* is located in Virginia. The dashed line represents Earth's axis.

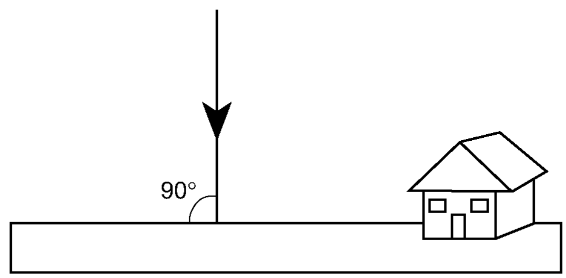


Which diagram best represents the angle of the Sun's rays received at location *C* at noon on this day?

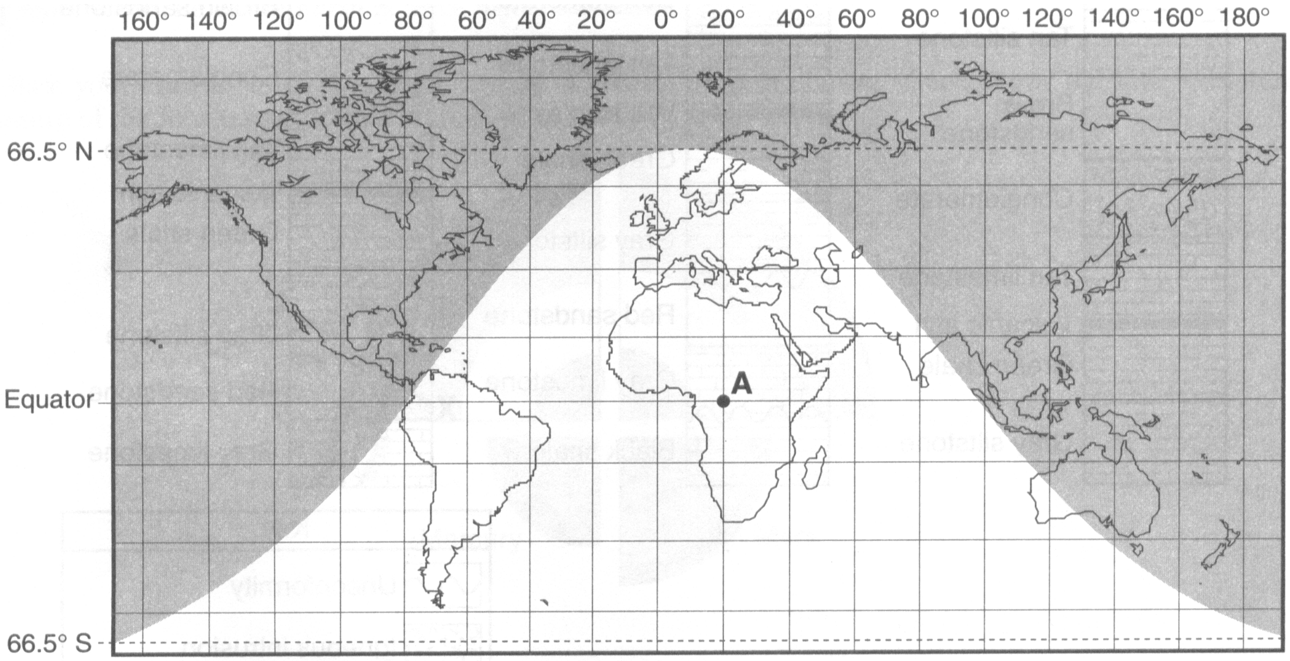
A) 

B) 

C) 

D) 

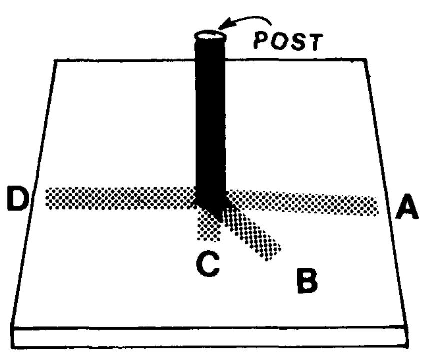
37. Base your answer to the following question on the world map below. The shaded portion of the map indicates areas of night, and the unshaded portion indicates areas of daylight on a certain day of the year. Dashed latitude lines represent the Arctic Circle (66.5° N) and the Antarctic Circle (66.5° S). Point *A* is a location on Earth's surface.



On this day, the duration of daylight from the equator to the Arctic Circle

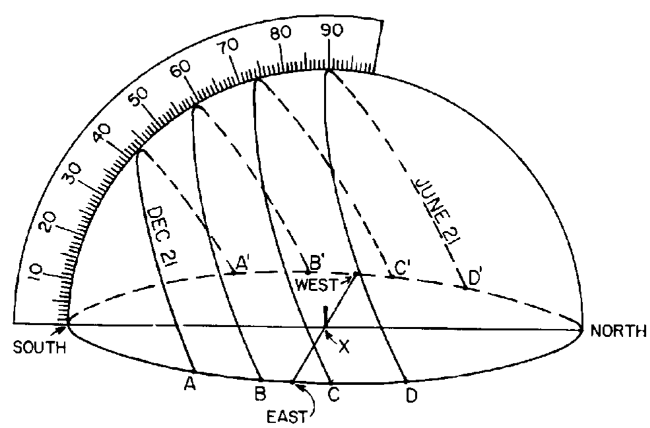
A) decreases, only
B) increases, only
C) decreases, then increases
D) increases, then decreases

38. In the diagram below, a vertical post casts shadows *A*, *B*, *C*, and *D* at four different times during the day. Which shadow was cast when this location was receiving the greatest intensity of insolation?



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

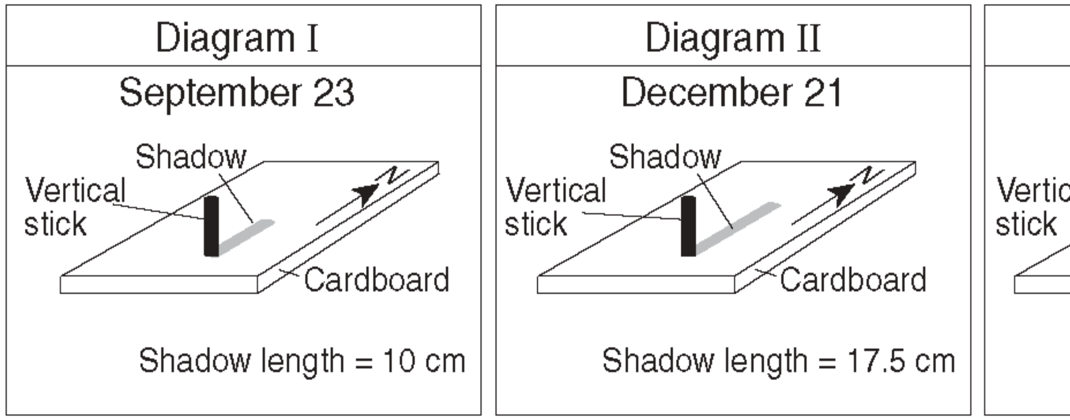
39. Base your answer to the following question on the diagram below. The diagram represents a plastic hemisphere upon which lines have been drawn to show the apparent paths of the Sun on four days at one location in the Northern Hemisphere. Two of the paths are dated. The protractor is placed over the north-south line. *X* represents the position of a vertical post.



Which path of the Sun would result in the longest shadow of the vertical post at solar noon?

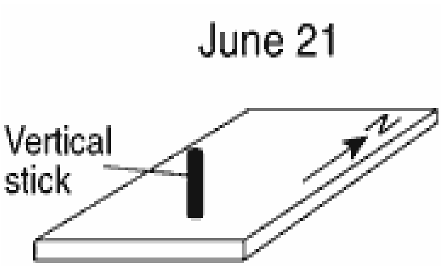
A) *A–A′* B) *B–B′* C) *C–C′* D) *D–D′*

40. Base your answer to the following question on diagrams I through III below. Diagrams I, II, and III represent the length and direction of the shadow of a vertical stick measured at noon on three

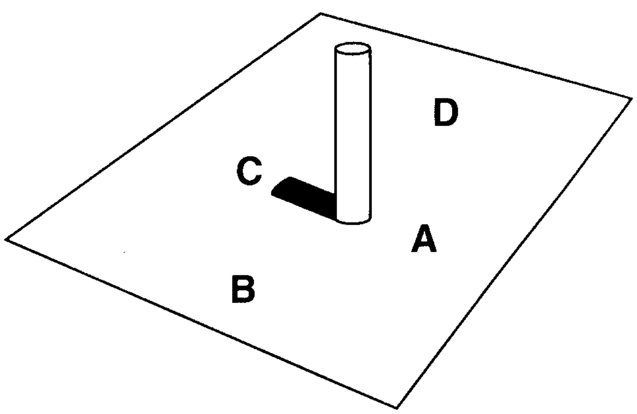


different dates at 42° N latitude.

On the diagram provided, draw the direction and length of the shadow at noon that will most likely be observed at 42° N latitude on June 21.



41. The diagram below shows the noontime shadow cast by a vertical post located in New York State.



Which letter indicates a location west of the post?

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