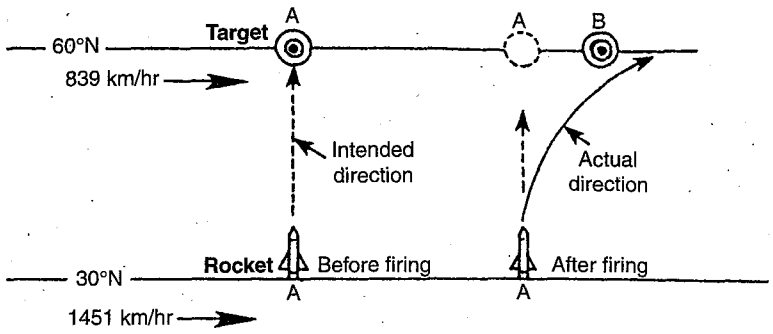


Figure 9-19. A rocket fired due north will appear to follow a curved path. The rocket will be deflected to the right in the Northern Hemisphere.

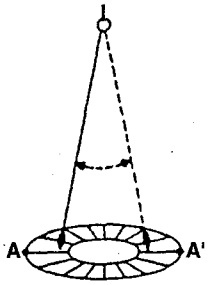
Other evidence. A satellite placed in a polar orbit can show that Earth is rotating, because different locations pass under the cameras every hour. Other indirect evidence of Earth's rotation includes the cycle of day and night and star-trail photos.

The geocentric model does not explain such apparent terrestrial motions as the Coriolis Effect and rotation of the Foucault Pendulum. Also, the need for epicycles to explain retrograde motion makes the model very complex.

The heliocentric model accounts for apparent terrestrial motions, such as the Foucault Pendulum and the Coriolis Effect, and is simpler than the geocentric model in many respects.

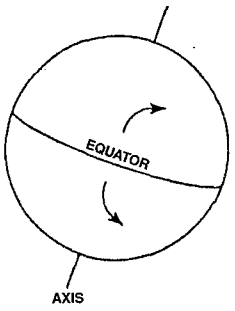
QUESTIONS

1. The following diagram represents a Foucault Pendulum in a building in New York State. Points A and A^1 are fixed points on the floor. As the pendulum swings for six hours, it will



(1) appear to change position due to Earth's rotation
(2) appear to change position due to Earth's revolution
(3) continue to swing between A and A^1 due to inertia
(4) continue to swing between A and A^1 due to air pressure

2. In the diagram below, the arrows represent the paths of moving fluids on the surface of Earth.



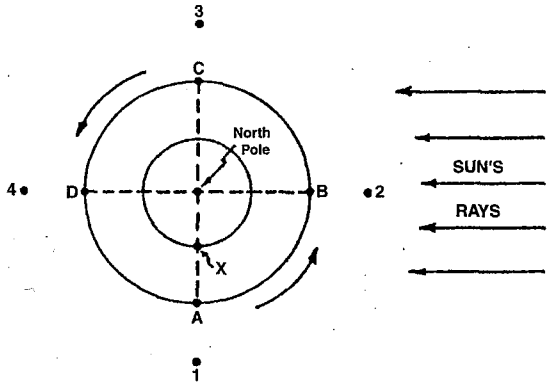
Which statement best explains why the fluid is deflected?

(1) Earth is rotating on its axis.
(2) The axis of Earth is tilted.
(3) Earth is revolving around the Sun.
(4) Earth is moving away from the Sun.

Base your answers to questions 3 and 4 on your knowledge of Earth Science and the diagram below. The diagram represents the entire Northern Hemisphere of Earth, as viewed by an observer directly over the North Pole.

The letters represent positions on the surface of Earth.
The numbers represent stationary positions in space directly above Earth's surface.

The curved arrows indicate the direction of Earth's rotation on its axis.



3. A rocket is fired from the North Pole directly at point A. To an observer at p... Earth's surface, the rocket's path appears to curve and it misses point A. This is ... that
(1) gravitational attraction varies over the surface of Earth
(2) Earth rotates on its axis
(3) Earth orbits around the Sun in an elliptical path
(4) differences in air pressure exist between the North Pole and point A

Pages 461-465

1.	1
2.	1
3.	2
4.	2
5.	2
6.	1
7.	1
8.	4
9.	4
10.	4
11.	2

Pages 469-473

1.	1
2.	3
3.	1
4.	4
5.	2
6.	1
7.	4
8.	1
9.	3
10.	3
11.	2
12.	2
13.	1
14.	2
15.	2
16.	4

4. A Foucault Pendulum is set in motion at the North Pole so that it traces a path along line D-B. After six hours, an observer in space directly over the North Pole would see the pendulum tracing a path between positions

(1) 1 and 2 (2) 1 and 3 (3) 2 and 4 (4) 3 and 4

5. As one moves from the poles toward the equator, the velocity of Earth's surface caused by Earth's rotation

(1) decreases (2) increases (3) remains the same

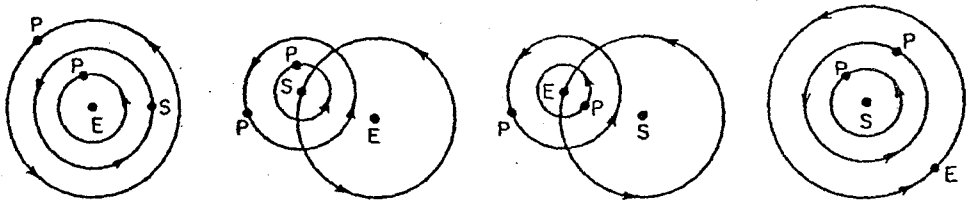
6. The Coriolis Effect would be influenced most by a change in Earth's

(1) rate of rotation
(2) period of revolution
(3) angle of tilt
(4) average surface temperature

7. Planet X is similar in all respects to Earth except that it does *not* rotate on its axis. A Foucault Pendulum is allowed to swing freely on planet X. After 6 hours of swinging, the path of the pendulum's swing, as seen by an observer on planet X, will be

(1) the same as the original path
(2) 90° to the right of the original path
(3) 90° to the left of the original path
(4) 180° to the right of the original path

8. Which diagram best represents a heliocentric model of a portion of the solar system? [Key: E = Earth, P = Planet, S = Sun. Diagrams are not drawn to scale.]

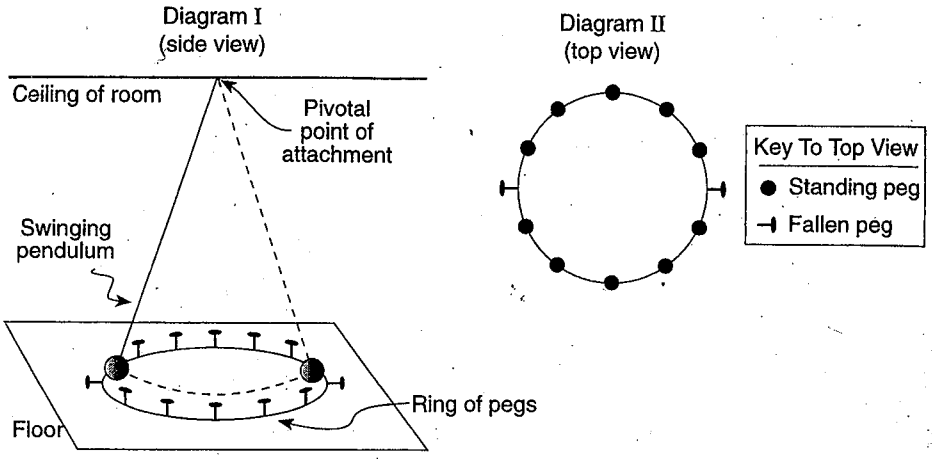


(1) (2) (3) (4)

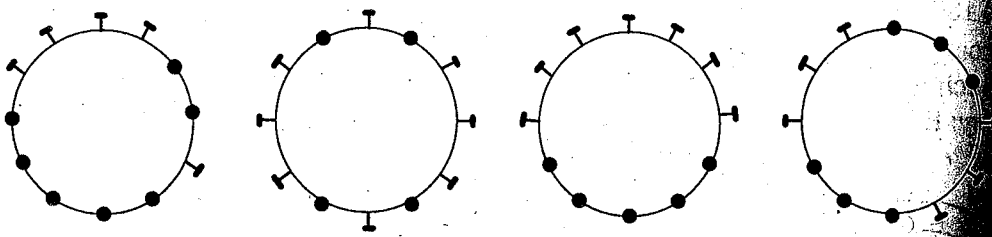
9. In the geocentric model (Earth at the center of the Universe), which motion would occur?

(1) Earth would revolve around the Sun.
(2) Earth would rotate on its axis.
(3) The Moon would revolve around the Sun.
(4) The Sun would revolve around Earth.

Base your answers to question 10 on the diagrams below, which represent two views of a swinging Foucault Pendulum with a ring of 12 pegs at its base.

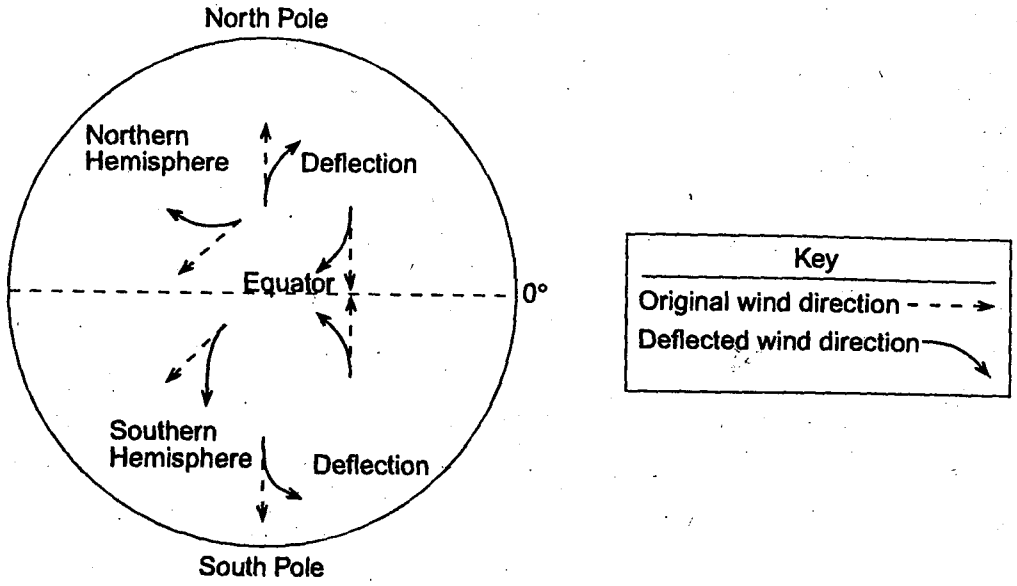


10. Diagram II shows two pegs tipped over by the swinging pendulum at the beginning of a demonstration. Which diagram shows the pattern of standing pegs and fallen pegs after several hours?



(1) (2) (3) (4)

11. The diagram below shows some examples of how surface winds are deflected in the Northern and Southern Hemispheres because of Earth's rotation.



Earth's rotation causes winds to be deflected to the

(1) right in both the Northern and Southern Hemispheres
(2) right in the Northern Hemisphere and left in the Southern Hemisphere
(3) Left in the Northern Hemisphere and right in the Southern Hemisphere
(4) left in both the Northern and Southern Hemispheres

pparent Diameter

When observed through a telescope, the diameters of the planets seem to change in a clic manner. These changes are *apparent*. The **apparent diameter** of an object is the meter the object *appears* to have, not its actual diameter. As with any object, the closer the net is to the observer, the larger it appears to be. As the planets revolve in their orbits und the Sun, their distances from Earth vary. The closer a planet is to Earth, the larger its parent diameter; the more distant the planet, the smaller its apparent diameter. Several of planets have identifiable objects on their surfaces, the most notable being the Great Red t on the surface of Jupiter. When observed over a period of time, these identifiable objects ear to change positions on the surfaces of the planets. These apparent changes in position ur in a cyclic fashion and indicate that the planets are rotating.

Seasonal Observations of the Sun from The Northern Hemisphere

Approximate Date	Latitude of Sun's Direct Ray	Direction of Sunrise and Sunset	Altitude of Noon Sun	Period of Daylight
September 23 (Autumnal Equinox)	Equator (0°)	Rises due E Sets due W	About 45°	12 hours
December 21 (Winter Solstice)	Tropic of Capricorn (23 1/2°S)	Rises S of E Sets S of W	Smallest angle (lowest in sky)	less than 12 hours (shortest day)
March 21 (Vernal Equinox)	Equator (0°)	Rises due E Sets due W	About 45	12 hours
June 21 (Summer Solstice)	Tropic of Cancer (23 1/2°N)	Rises N of E Sets N of W	Largest angle (highest in sky)	More than 12 hours (longest day)

TABLE 9-3

QUESTIONS

1. From September to November, the Sun's altitude at noon in the Northern Hemisphere

(1) decreases (2) increases (3) remains the same

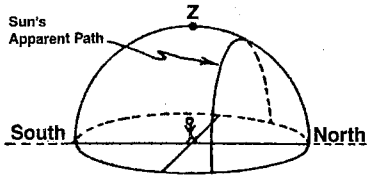
2. Earth's axis of rotation is tilted 23½° from a line perpendicular to the plane of its orbit. What would be the result if the tilt were only 13½°?

(1) shorter days and longer nights at the equator
(2) colder winters and warmer summers in New York State
(3) less difference between winter and summer temperatures in New York State
(4) an increase in the amount of solar radiation received by Earth

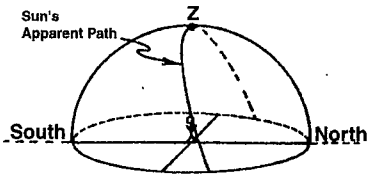
3. New York State has several more hours of daylight in summer than in winter. Which statement helps explain this observation?

(1) Earth is tilted on its axis.
(2) The distance between Earth and the Sun varies.
(3) The diameter of the Sun appears to change.
(4) The speed of Earth in its orbit changes.

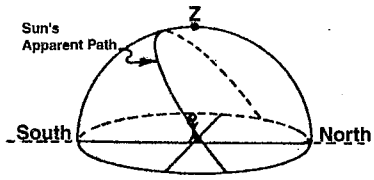
Base your answers to questions 4 through 6 on your knowledge of Earth Science and on the diagrams below. The diagrams represent plastic hemisphere models. Lines have been drawn to show the apparent path of the Sun across the sky on June 21 for observers at four different Earth locations. The zenith (Z) is the point in the sky directly over the observer.



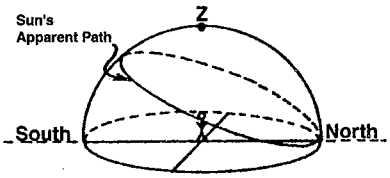
EQUATOR (0°)



TROPIC OF CANCER (23.5°N)



CENTRAL NEW YORK STATE (42.5°N)



ARCTIC CIRCLE (66.5°N)

4. At which location will the longest noontime shadow be observed?

(1) Equator
(2) Tropic of Cancer
(3) central New York State
(4) Arctic Circle

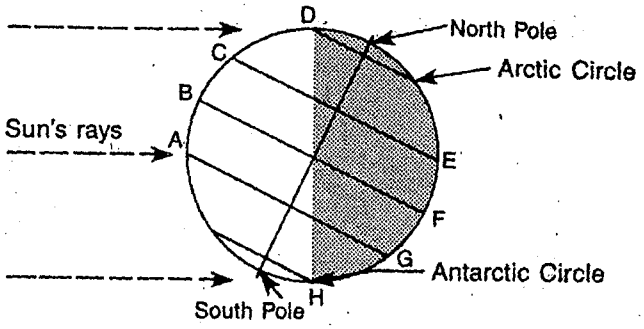
5. Which location will receive the greatest intensity of insolation at solar noon?

(1) Equator
(2) Tropic of Cancer
(3) central New York State
(4) Arctic Circle

6. In three months, the length of a day in central New York State will be

(1) shorter, because the Sun will rise and set farther south
(2) shorter, because the Sun will rise and set farther north
(3) longer, because the Sun will rise and set farther south
(4) longer, because the Sun will rise and set farther north

Base your answers to questions 7 through 9 on your knowledge of Earth Science and the diagram below. The diagram represents Earth at a specific time in its orbit with dash lines indicating radiation from the Sun and points A through H, locations on Earth's surface.



7. What is the season in the Northern Hemisphere when the Earth is in the position shown in the diagram?

(1) spring (2) summer (3) fall (4) winter

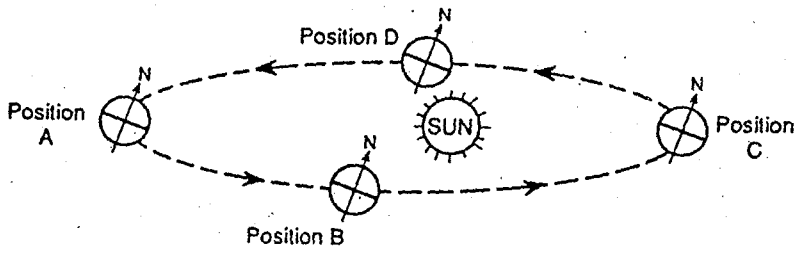
8. When the Sun is in the position shown in the diagram, how many hours of daylight would occur at the North Pole during one complete rotation?

(1) 0 (2) 8 (3) 12 (4) 24

9. Six months after the date indicated by the diagram, which point would receive the Sun's vertical rays at noon?

(1) A (2) B (3) C (4) D

The diagram below represents four positions of Earth as it revolves around the Sun.

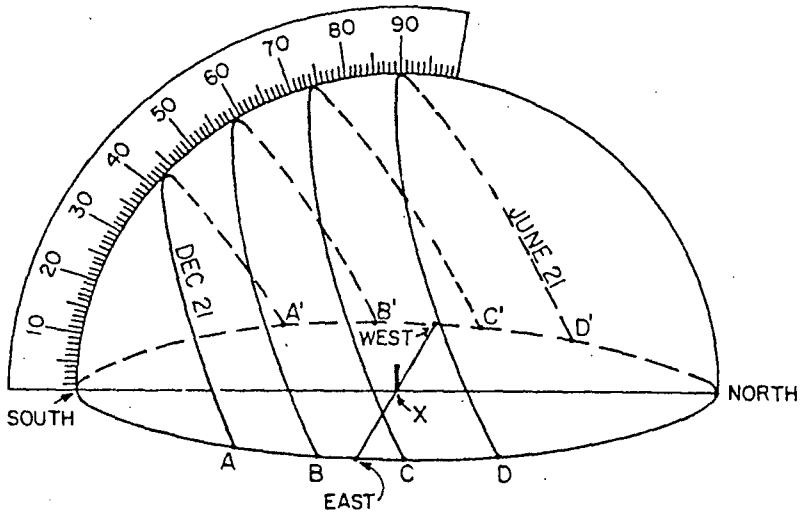


(NOT DRAWN TO SCALE)

which position is Earth located on December 21?

(2) B (3) C (4) D

Base your answers to questions 11 through 12 on your knowledge of Earth Science and 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.



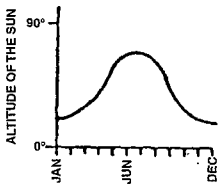
11. How many degrees does the altitude of the Sun change from December 21 to June 21?

(1) 43° (2) 47° (3) 66½° (4) 74°

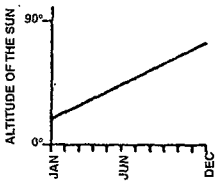
12. What is the latitude of this location?

(1) 0° (2) 23½°N (3) 66½°N (4) 90°N

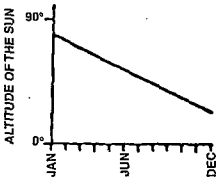
13. Which graph best represents the relationship between the maximum altitude of the Sun and the time of year in New York State?



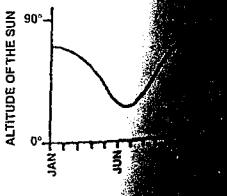
(1)



(2)

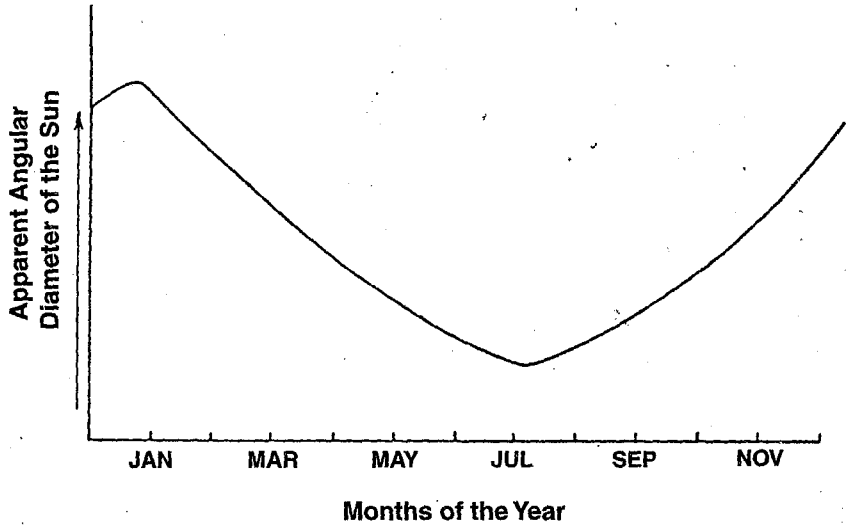


(3)



(4)

Base your answers to questions 14 through 16 on your knowledge of Earth Science and the diagram below. The diagram represents the apparent angular diameter of the Sun as measured by an observer on Earth during one year.



14 How did the apparent angular diameter of the Sun change from June to September?

(1) It decreased steadily.
(2) It decreased, then increased.
(3) It increased steadily.
(4) It remained the same.

15 The apparent diameter of the Sun decreases as the distance between the observer and the Sun

(1) decreases (2) increases (3) remains the same

16 The cyclic change in the apparent angular diameter of the Sun is a result of the

(1) Sun's daily rotational pattern
(2) Earth's daily rotational pattern
(3) Earth's circular orbit
(4) Earth's slightly elliptical orbit

TIME AND EARTH MOTIONS

Rotation and revolution of Earth provide the framework for measuring time. One ...tion of Earth around the Sun takes 365¼ days, or one year. One rotation of Earth on its ...onstitutes one day.

...rent Solar Day

...sing the position of a given star on two successive nights, Earth makes one complete ...on its axis in 23 hours, 56 minutes, and 4 seconds. This time period is called a ...l day (see Figure 9-22). If Earth did not revolve around the Sun, this time period