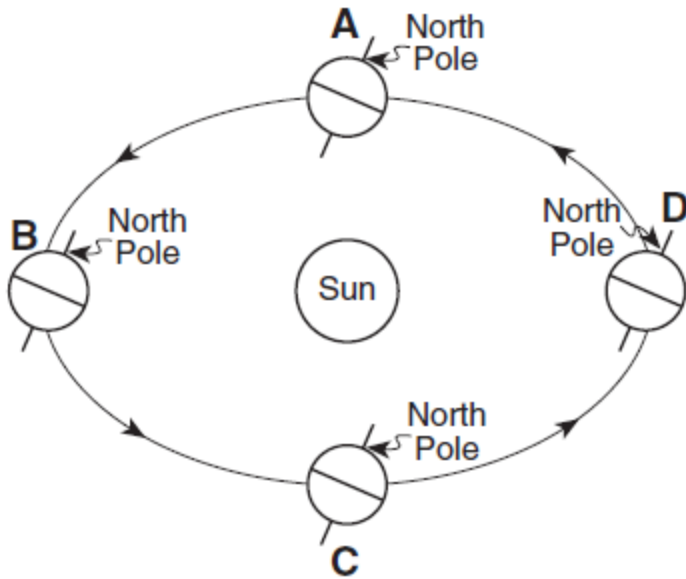


Topic 4 - Motions of Earth, Sun and Moon

1. Base your answer to the following question on the diagram below, which represents an exaggerated view of Earth revolving around the Sun. Letters *A*, *B*, *C*, and *D* represent Earth's location in its orbit on the first day of each of the four seasons.

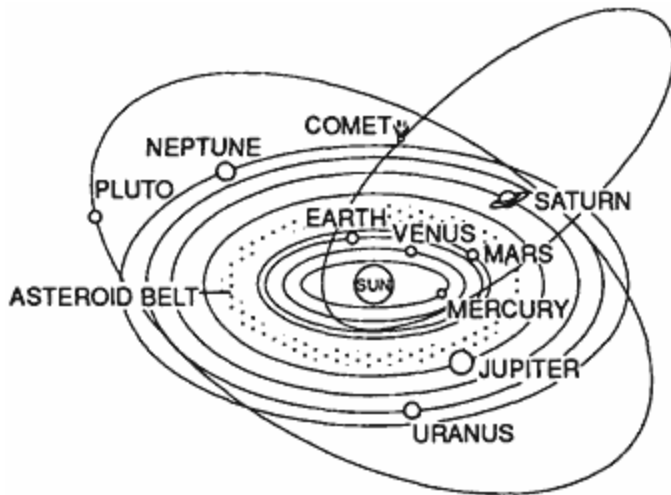


(Not drawn to scale)

Which location in Earth's orbit represents the first day of fall (autumn) for an observer in Pennsylvania?

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

2. The diagram below represents our solar system.



(NOT DRAWN TO SCALE)

This system is best classified as

- A) geocentric, with elliptical orbits
 B) geocentric, with circular orbits
 C) **heliocentric, with elliptical orbits**
 D) heliocentric, with circular orbits

3. Which planet's orbit around the Sun is most nearly circular?

- A) Mercury B) Neptune
 C) Pluto **D) Venus**

4. Which object is located at one foci of the elliptical orbit of Mars?

- A) the Sun** B) *Betelgeuse*
 C) Earth D) Jupiter

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

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

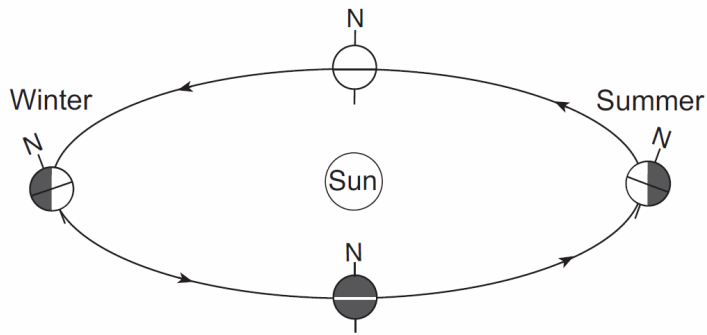
6. The time required for one Earth rotation is about

- A) one hour **B) one day**
 C) one month D) one year

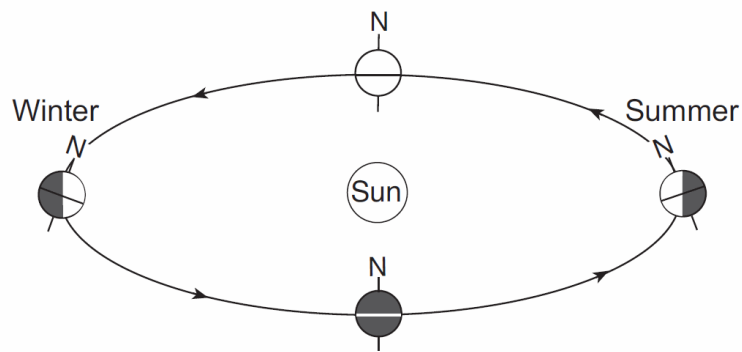
Topic 4 - Motions of Earth, Sun and Moon

7. Which diagram best represents the tilt of Earth's axis that causes the Northern Hemisphere seasons shown? (Diagrams are not drawn to scale.)

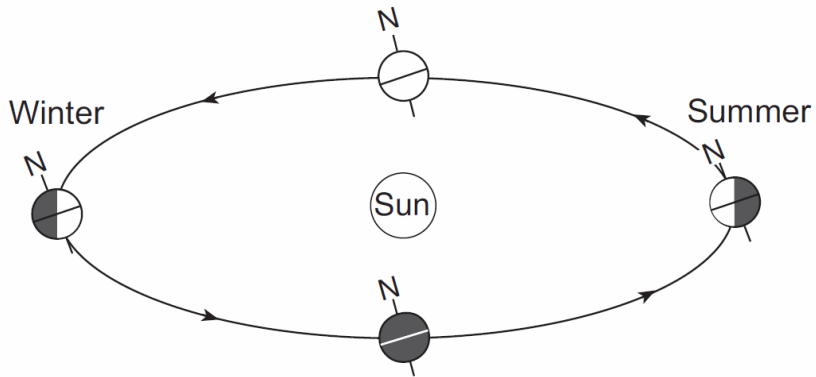
A)



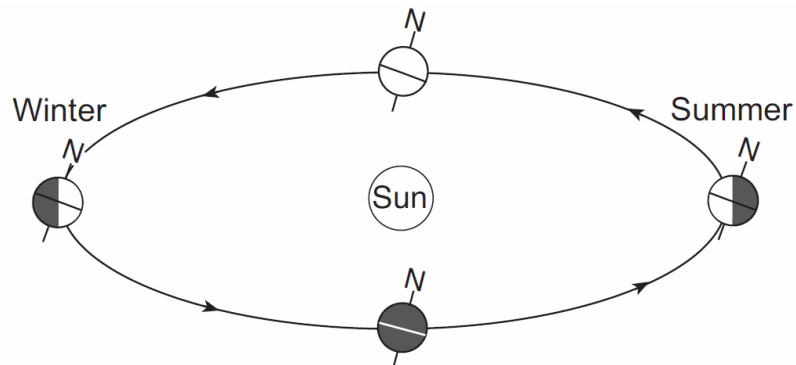
B)



C)

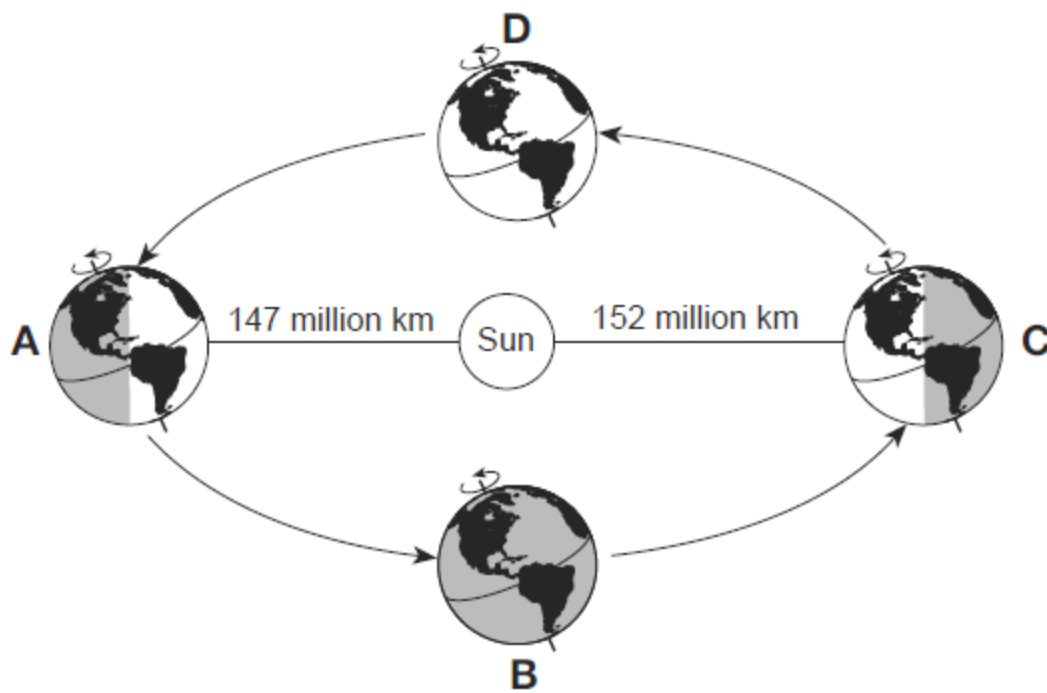


D)



Topic 4 - Motions of Earth, Sun and Moon

Base your answers to questions 8 and 9 on the diagram below and on your knowledge of Earth science. The diagram represents Earth in its orbit around the Sun. Locations *A* through *D* represent four positions of Earth in its orbit. Earth is closest to the Sun (perihelion) at position *A*, and farthest from the Sun (aphelion) at position *C*.



(Not drawn to scale)

8. At which position is the gravitational attraction between the Sun and Earth the greatest?

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

9. Which change in seasons occurs in the Northern Hemisphere at position *D*?

- A) Winter is ending and spring is beginning.
B) Spring is ending and summer is beginning.
C) **Summer is ending and fall is beginning.**
D) Fall is ending and winter is beginning.

10. Which statement provides the best evidence that Earth revolves around the Sun?

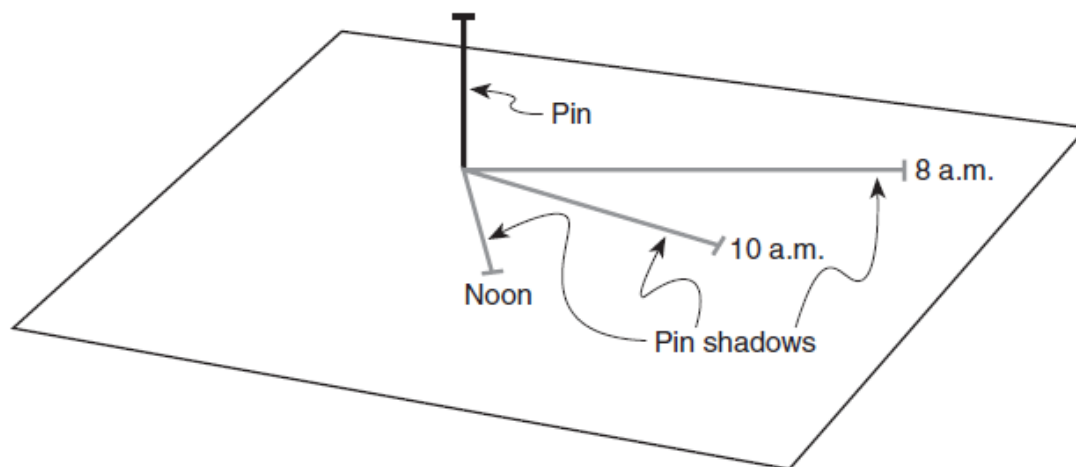
- A) The Sun follows an apparent daily path, rising in the east and setting in the west.
B) A Foucault pendulum appears to shift its direction of swing in a predictable manner.
C) The stars appear to follow circular paths around the North Star (*Polaris*).
D) **The seasons of spring, summer, fall, and winter repeat in a pattern.**

11. One factor responsible for the strength of gravitational attraction between a planet and the Sun is the

- A) degree of tilt of the planet's axis
B) **distance between the planet and the Sun**
C) planet's period of rotation
D) amount of insolation given off by the Sun

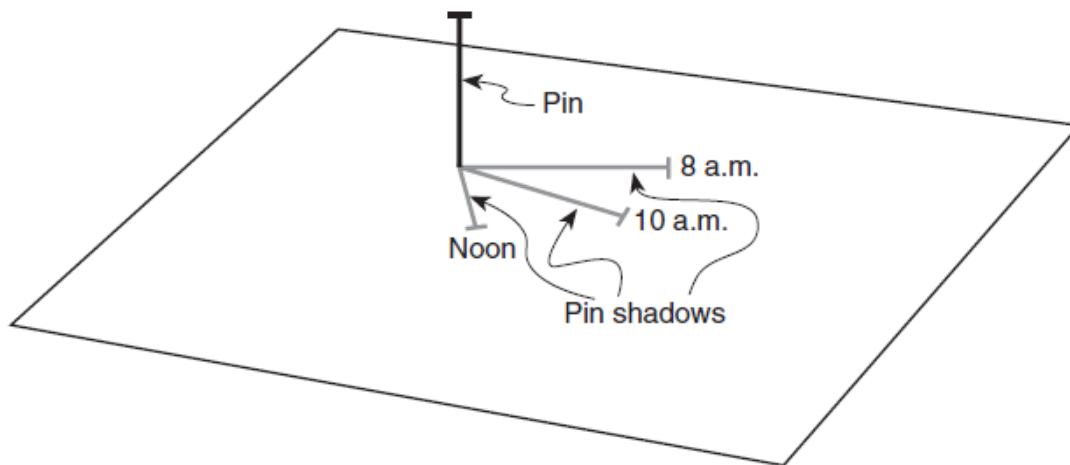
Topic 4 - Motions of Earth, Sun and Moon

12. Base your answer to the following question on the diagram below and on your knowledge of Earth science. The diagram shows a pin perpendicular to a card. The card was placed outdoors in the sunlight on a horizontal surface. The positions of the pin's shadow on the card were recorded several times on March 21 by an observer in New York State.



(Drawn to scale)

On June 21, the card and pin were placed in the same position as they were on March 21. The diagram below shows the positions of the pin's shadow.



(Drawn to scale)

Which statement best explains the decreased length of each shadow on June 21?

- A) **The Sun's apparent path varies with the seasons.**
 - B) The Sun's distance from Earth varies with the seasons.
 - C) The intensity of insolation is lower on June 21.
 - D) The duration of insolation is shorter on June 21.
-

Topic 4 - Motions of Earth, Sun and Moon

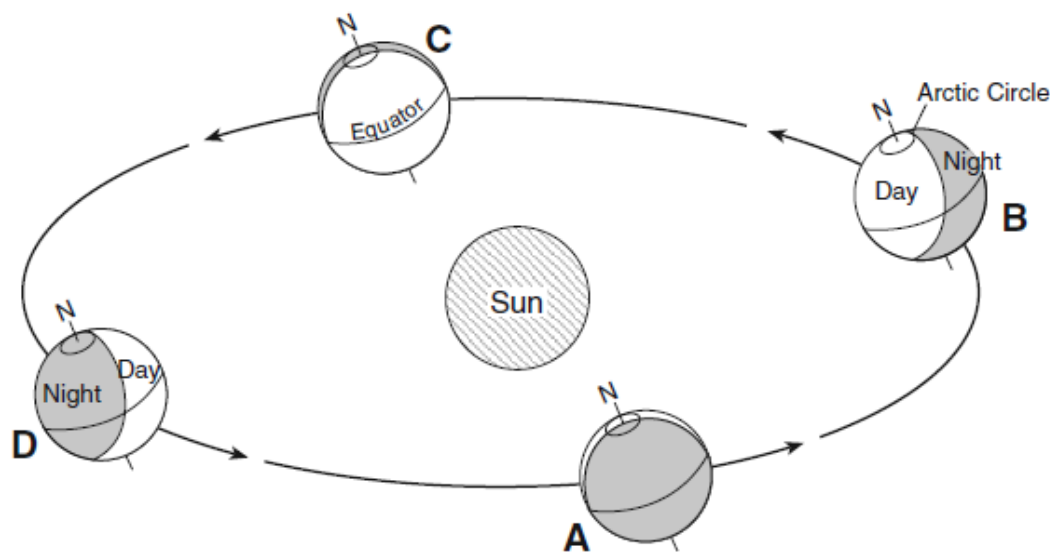
13. The photographs below show the surface of the Moon as seen from Earth over an 80-minute period during a single night.



Which motion is responsible for this changing appearance of the Moon?

- A) **The Moon moves into the shadow of Earth.**
- B) The Moon moves into the shadow of the Sun.
- C) The Sun moves into the shadow of Earth.
- D) The Sun moves into the shadow of the Moon.

14. 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)

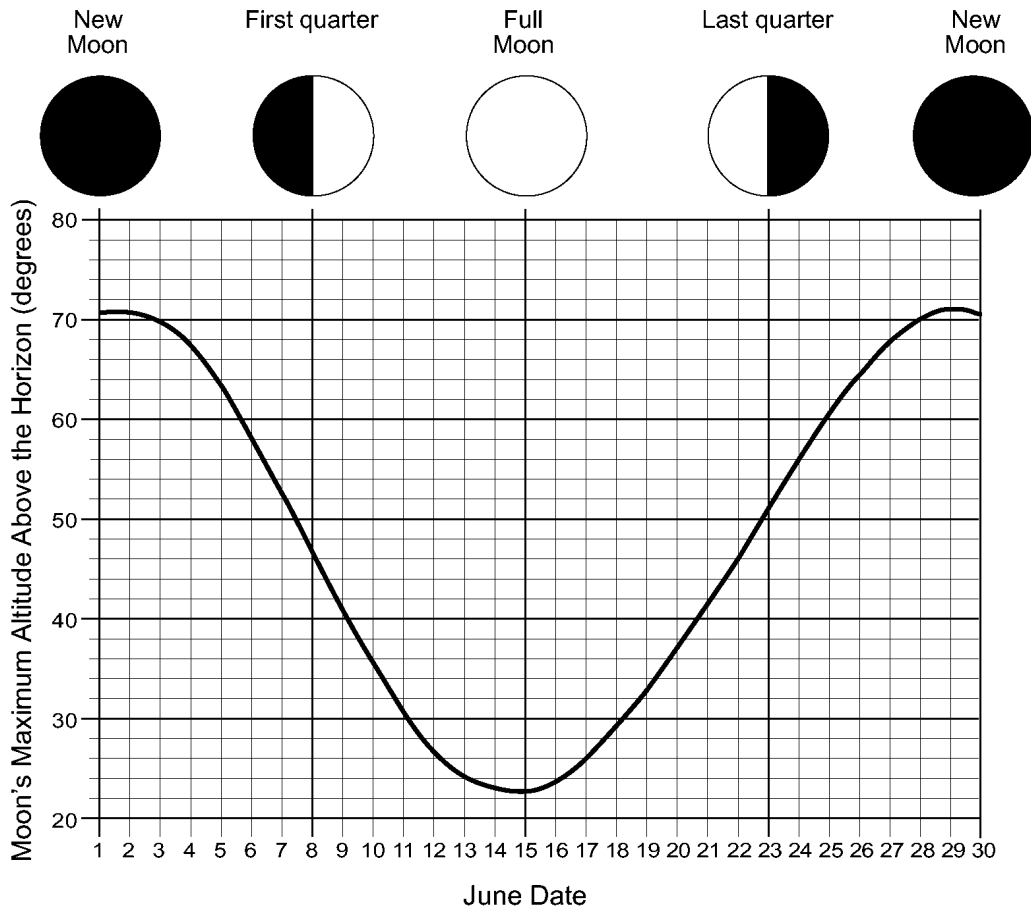
Which location represents March 21?

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


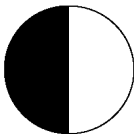
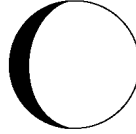
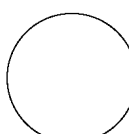
- | | |
|--|---|
| <p>15. The apparent rising and setting of the Sun, as viewed from Earth, is caused by</p> <ul style="list-style-type: none">A) Earth's rotationB) Earth's revolutionC) the Sun's rotationD) the Sun's revolution | <p>16. In the Northern Hemisphere, planetary winds are deflected to the right due to the</p> <ul style="list-style-type: none">A) Doppler effectB) Coriolis effectC) tilt of Earth's axisD) uneven heating of Earth's surface |
|--|---|

Topic 4 - Motions of Earth, Sun and Moon

17. Base your answer to the following question on the graph below, which shows the maximum altitude of the Moon, measured by an observer located at a latitude of 43° N during June in a particular year. The names and appearance of the four major Moon phases are shown at the top of the graph, directly above the date on which the phase occurred.



Which diagram best represents the Moon's phase observed on June 11?

- A)  B)  C)  D) 

18. The path of a Foucault pendulum provides evidence that Earth

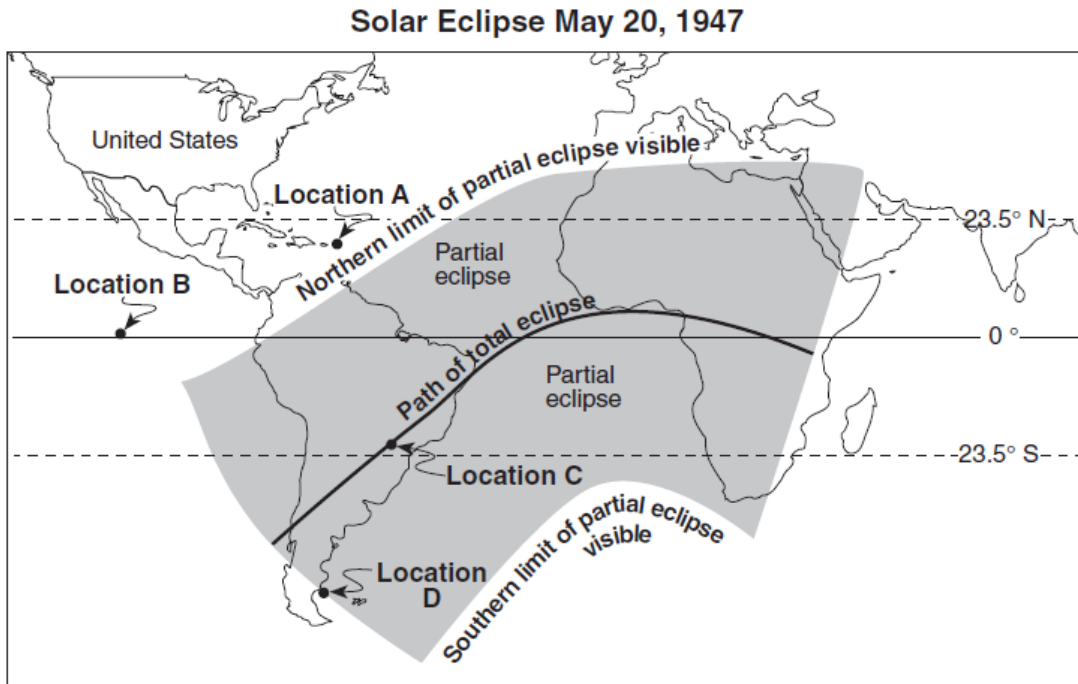
- A) rotates on its axis
- B) revolves in its orbit
- C) is tilted on its axis
- D) has an elliptical orbit

19. In October, observers in Ohio looking due south at the night sky would see a different group of constellations than they had seen in March. What is the best explanation for this change in the night sky?

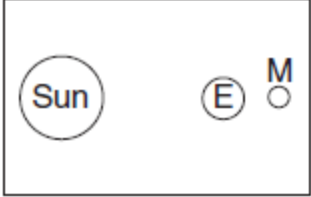


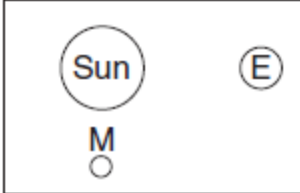
- A) Constellations revolve around Earth.
- B) Constellations revolve around the Sun.
- C) The Sun revolves around the center of our galaxy.
- D) Earth revolves around the Sun.

Topic 4 - Motions of Earth, Sun and Moon

20. Base your answer to the following question on the world map below, which shows regions of Earth where a solar eclipse was visible on May 20, 1947. Location *A*, *B*, *C*, and *D* are on Earth's surface.



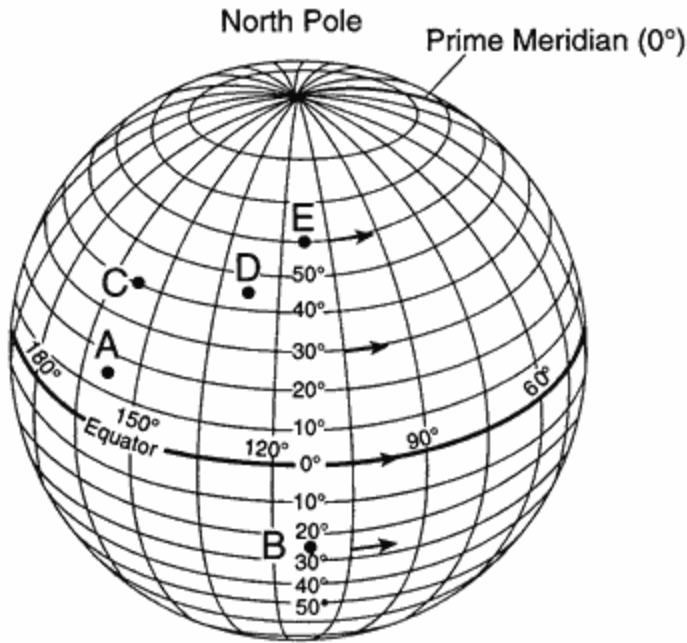
Which diagram best represents the positions of Earth (*E*), the Sun, and the Moon that created the solar eclipse? (Diagrams are not drawn to scale.)

- A) 
- B) 
- C) 
- D) 

21. The best evidence that Earth rotates is provided by the
- A) location of mid-oceanic ridge volcanoes and the distribution of index fossils
 - B) movement of Foucault pendulums and the Coriolis effect on air movement**
 - C) pattern of changing seasons and the depth of meteor impacts
 - D) rate of uranium-238 decay and changes in atmospheric composition

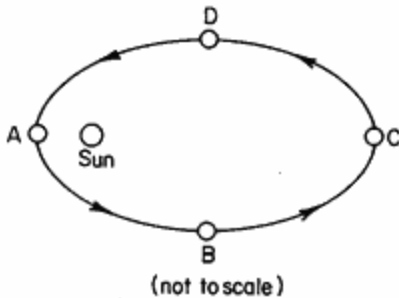
Topic 4 - Motions of Earth, Sun and Moon

22. Base your answer to the following question on the diagram below, which represents latitude and longitude lines on Earth. Points *A* through *E* represent locations on Earth. Arrows represent direction of rotation.



When the local time at location *C* is 3 p.m., the local time at location *D* is

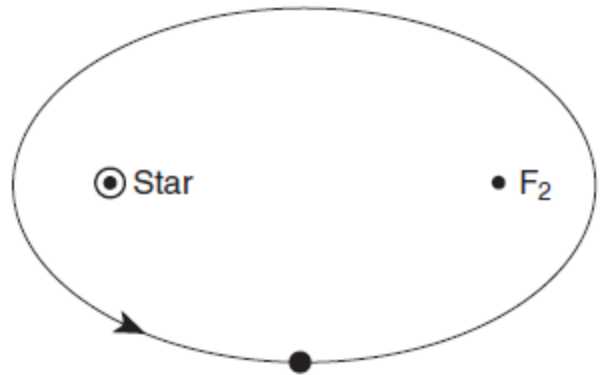
- A) 1 p.m. B) 5 p.m. C) 3 p.m. D) 3 a.m.
23. The diagram below shows a planet's orbit around the Sun.



At which location is the planet's orbital velocity greatest?

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

24. The diagram below shows the elliptical orbit of a planet revolving around a star. The star and F_2 are the foci of this ellipse.

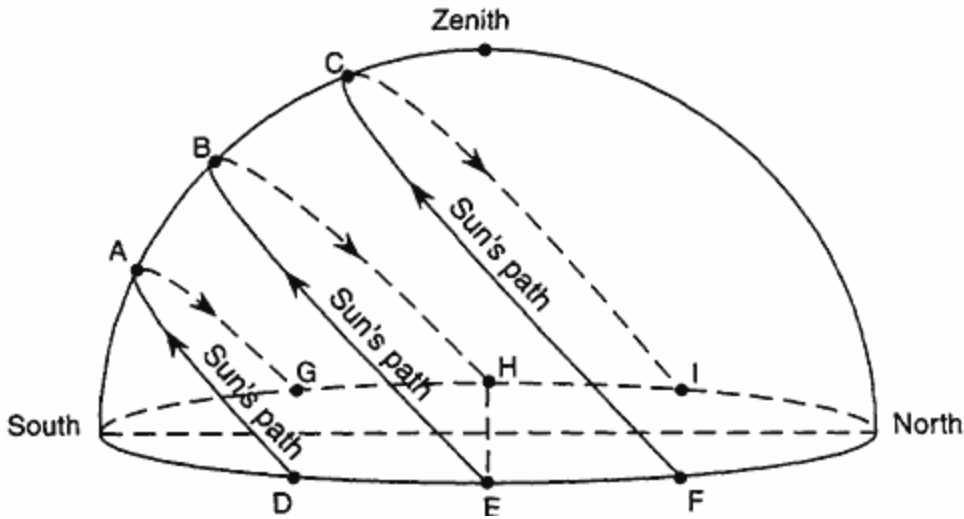


What is the approximate eccentricity of this ellipse?

- A) 0.22 B) 0.47 C) 0.68 D) 1.47

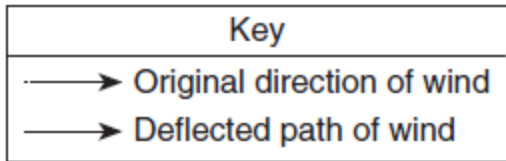
Topic 4 - Motions of Earth, Sun and Moon

25. The diagram below represents a plastic hemisphere upon which lines have been drawn to show the apparent paths of the Sun at a location in New York State on the first day of each season. Letters *A* through *I* represent points on the paths.



Which point represents the sunrise location on the first day of winter?

- A) *G* B) *F* C) *E* **D) *D***
26. Which diagram correctly shows how surface winds are deflected (curved) in the Northern and Southern Hemispheres due to Earth's rotation?



- A) **North Pole**

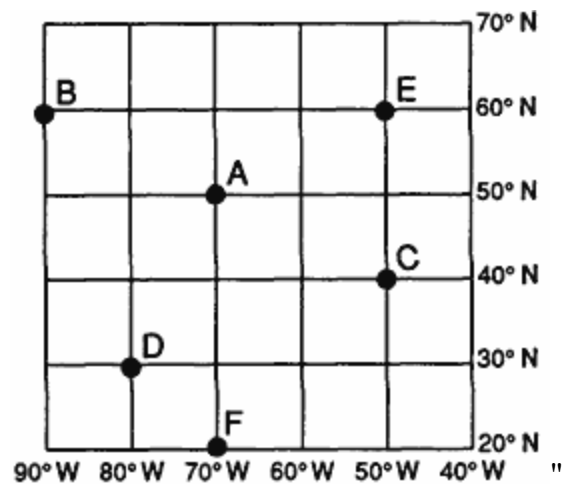
 Rotation
- B) **North Pole**

 Rotation
- C) **North Pole**

 Rotation
- D) **North Pole**

 Rotation

27. Base your answer to the following question on "the latitude and longitude system shown below. The map represents a part of the Earth's surface and its latitude-longitude coordinates. Points *A* through *F* represent locations in this area.

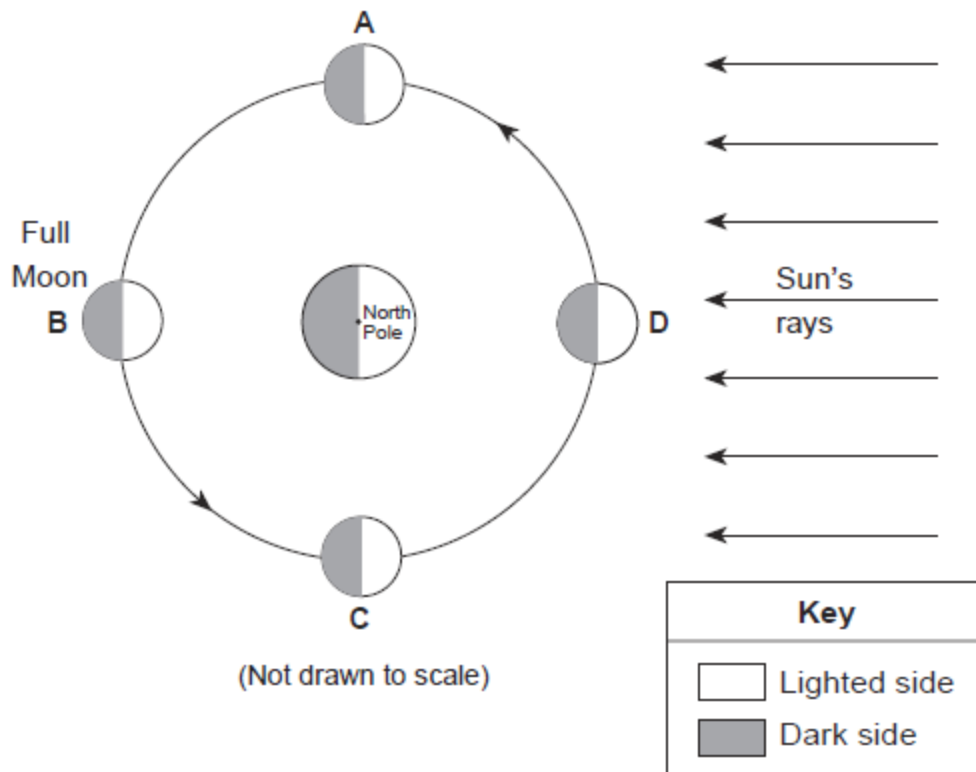


Points *B* and *E* would *not* have the same value for measurements of

- A) latitude
B) time
 C) duration of solar day
 D) altitude of the Sun at solar noon

Topic 4 - Motions of Earth, Sun and Moon

28. Base your answer to the following question on the diagram below and on your knowledge of Earth science. The diagram represents the Moon at four positions, labeled *A*, *B*, *C*, and *D*, in its orbit around Earth. The position of the full-Moon phase is labeled.

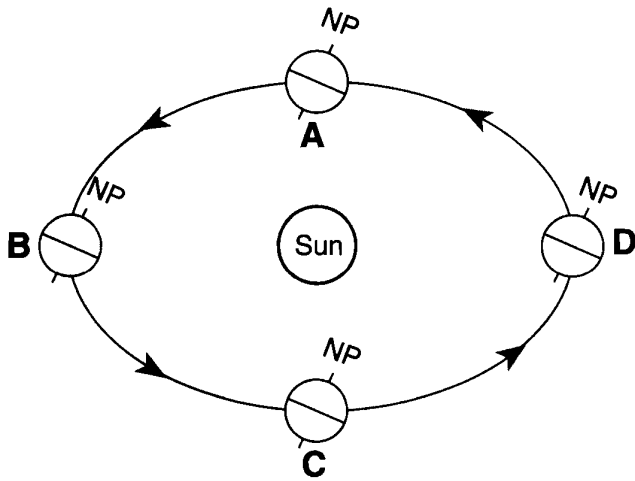


The same side of the Moon always faces Earth because the Moon's period of revolution

- A) is longer than the Moon's period of rotation
- B) equals the Moon's period of rotation**
- C) is longer than Earth's period of rotation
- D) equals Earth's period of rotation

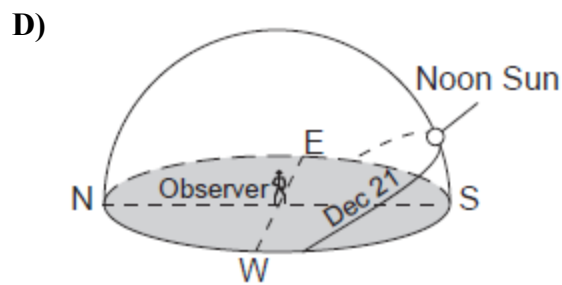
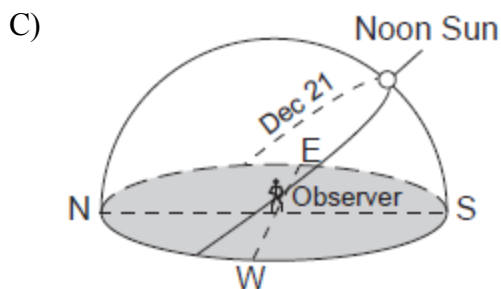
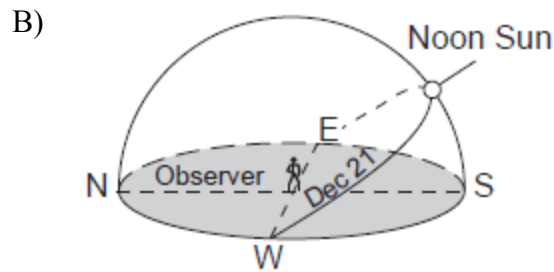
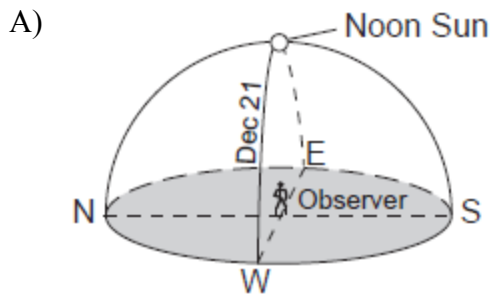
Topic 4 - Motions of Earth, Sun and Moon

29. Base your answer to the following question on the diagram below, which represents Earth revolving around the Sun. Letters *A*, *B*, *C*, and *D* represent Earth's location in its orbit on the first day of the four seasons. NP represents the North Pole.



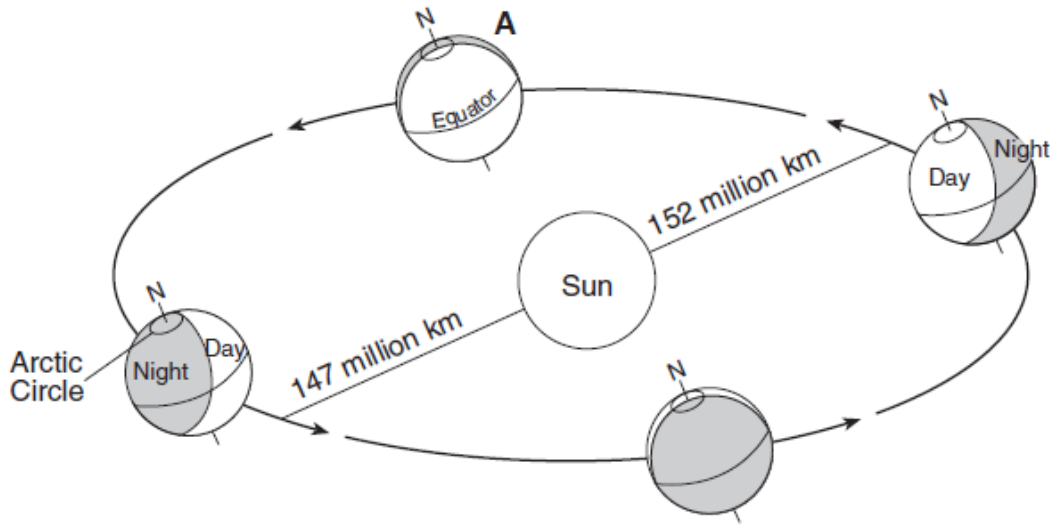
(Not drawn to scale)

Which diagram best represents the Sun's apparent path as seen by an observer at 43.5° N latitude on December 21?



Topic 4 - Motions of Earth, Sun and Moon

30. Base your answer to the following question on the diagram below and on your knowledge of Earth science. The diagram represents Earth's position in its orbit on the first day of each of the four seasons, one of which is labeled *A*. The North Pole is labeled *N*. Earth's closest distance to the Sun and Earth's farthest distance from the Sun are labeled in kilometers.



(Not drawn to scale)

When Earth is closest to the Sun, which season is occurring in the Northern Hemisphere?

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

Answer Key
Topic 4 - Motions of Earth, Sun and Moon

1. C
 2. C
 3. D
 4. A
 5. B
 6. B
 7. C
 8. A
 9. C
 10. D
 11. B
 12. A
 13. A
 14. A
 15. A
 16. B
 17. C
 18. A
 19. D
 20. B
 21. B
 22. B
 23. A
 24. C
 25. D
 26. C
 27. B
 28. B
 29. D
 30. D
-