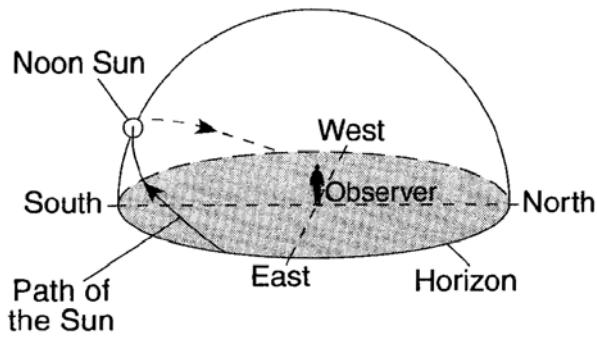
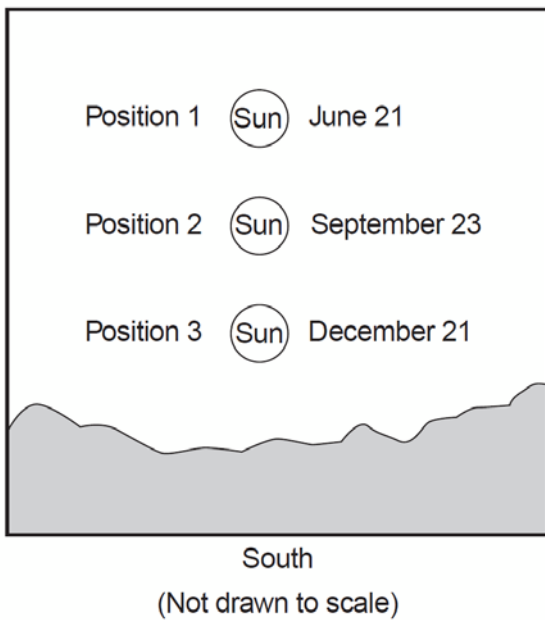


1. The model below shows the apparent path of the Sun as seen by an observer in New York State on the first day of one of the four seasons.



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

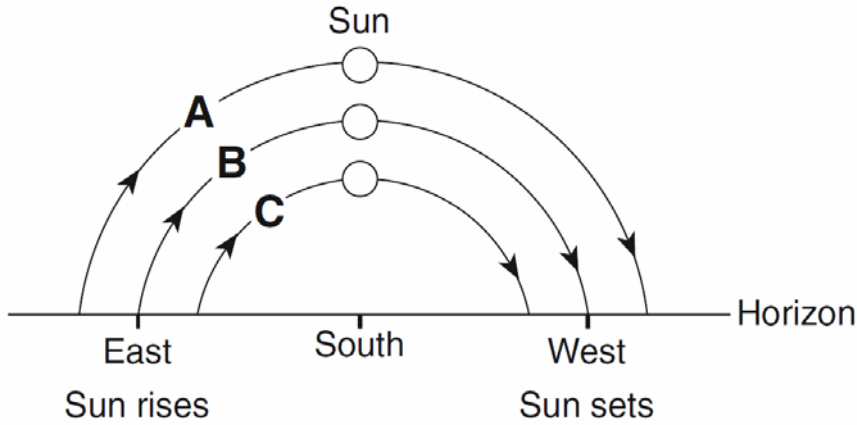
- A) spring B) summer
C) fall D) winter
2. Positions 1, 2, and 3 in the diagram below represent the noon Sun above the horizon on three different days during the year, as viewed from Binghamton, New York.



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

3. 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

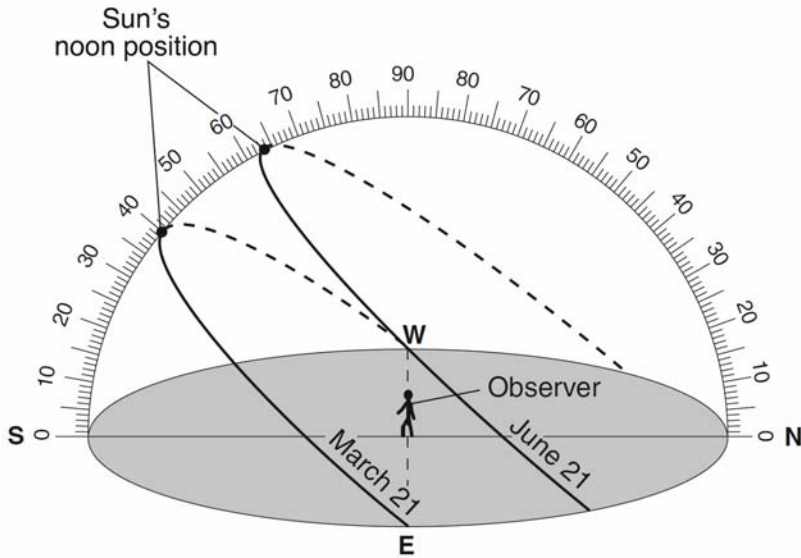
D)

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

4. During which Northern Hemisphere season is Earth closest to the Sun?

- A) spring B) summer
C) autumn D) winter

5. Base your answer to the following question on diagram and data table below. The diagram represents the Sun's apparent paths as viewed by an observer located at 50° N latitude on June 21 and March 21. The data table shows the Sun's maximum altitude for the same two dates of the year. The Sun's maximum altitude for December 21 has been left blank.



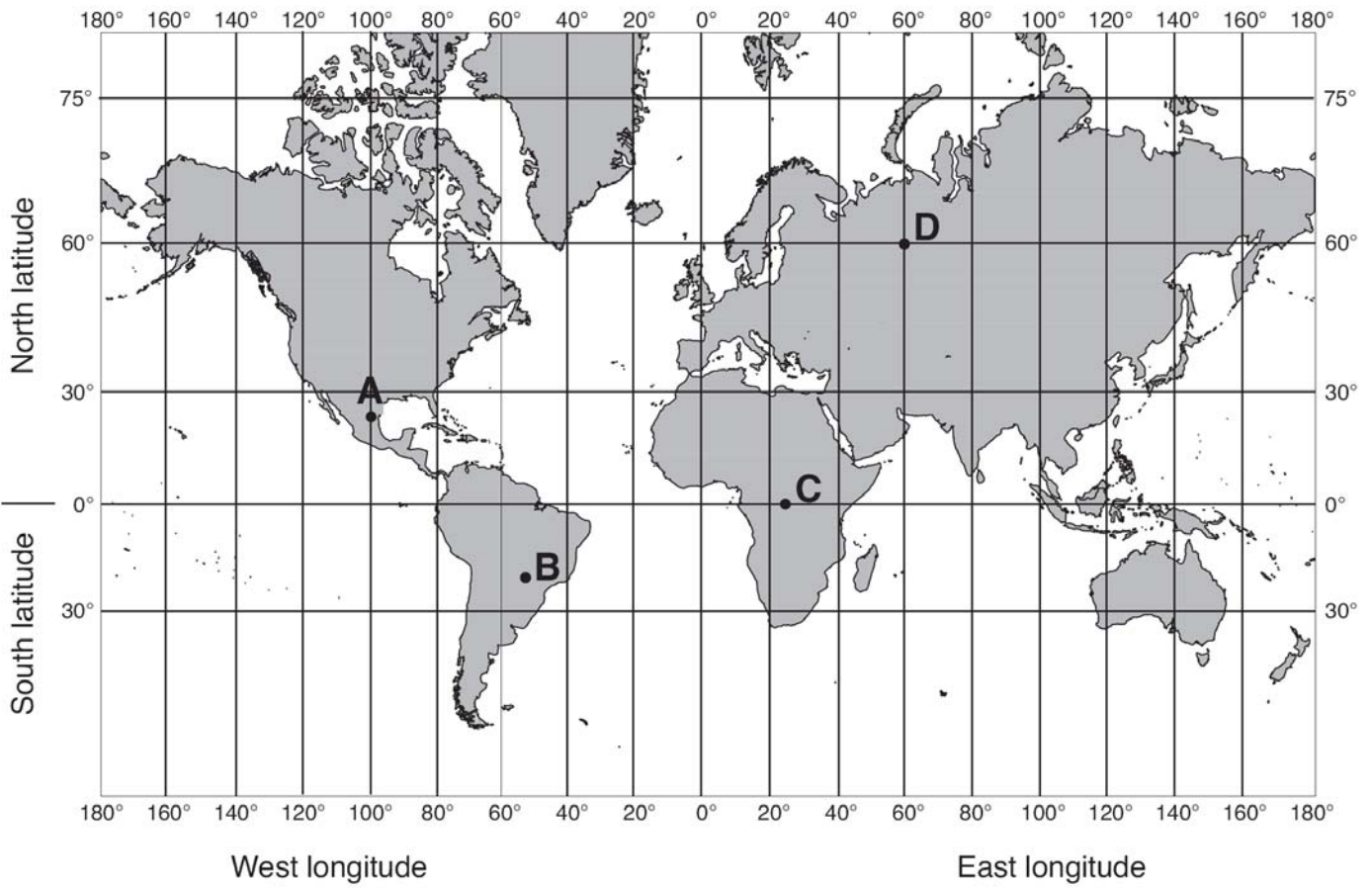
Data Table

Date	Sun's Maximum Altitude
June 21	63.5°
March 21	40°
December 21	

Which value should be placed in the data table for the Sun's maximum altitude on December 21?

- A) 16.5° B) 23.5° C) 40° D) 90°
-
6. 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
7. Which two factors cause the perpendicular rays of the Sun to move between 23.5° N and 23.5° S?
- A) tilt of Earth's axis and Earth's revolution
B) tilt of Earth's axis and Earth's rotation
C) eccentricity of Earth's orbit and Earth's revolution
D) eccentricity of Earth's orbit and Earth's rotation
8. 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

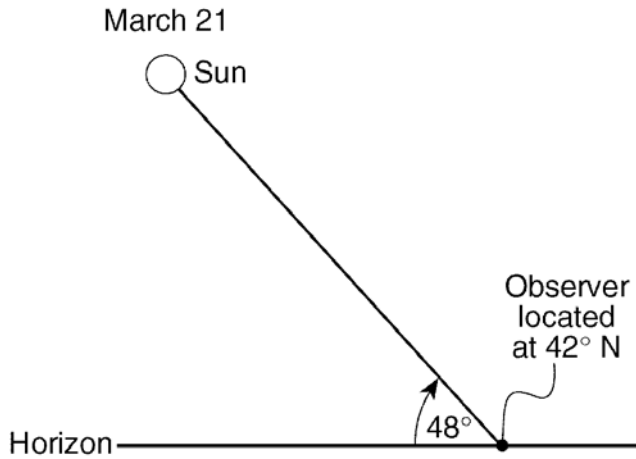
9. Base your answer to the following question on the world map below. Letters *A* through *D* represent locations on Earth's surface.



At which location on December 21 is the Sun directly overhead at solar noon?

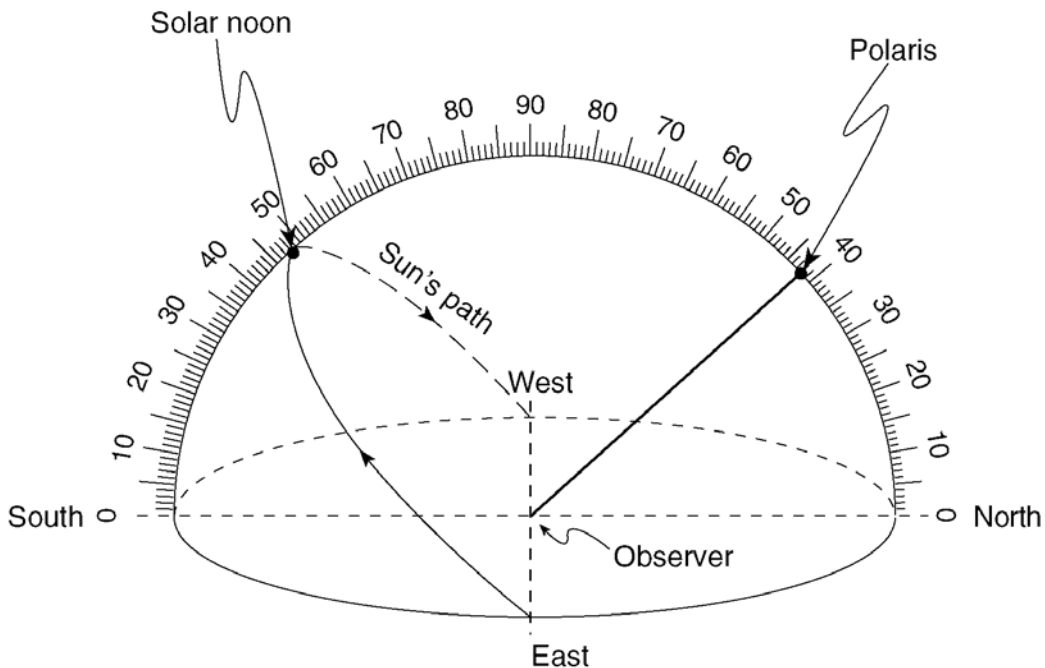
- A) A
- B) B
- C) C
- D) D

10. The diagram below shows the altitude of the Sun at solar noon on March 21, as seen by an observer at 42° N latitude.



Compared to the altitude of the Sun observed at solar noon on March 21, the altitude of the Sun observed at solar noon on June 21 will be

- A) 15° higher in the sky
 - B) 23.5° higher in the sky
 - C) 42° higher in the sky
 - D) 48° higher in the sky
11. Base your answer to the following question 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.



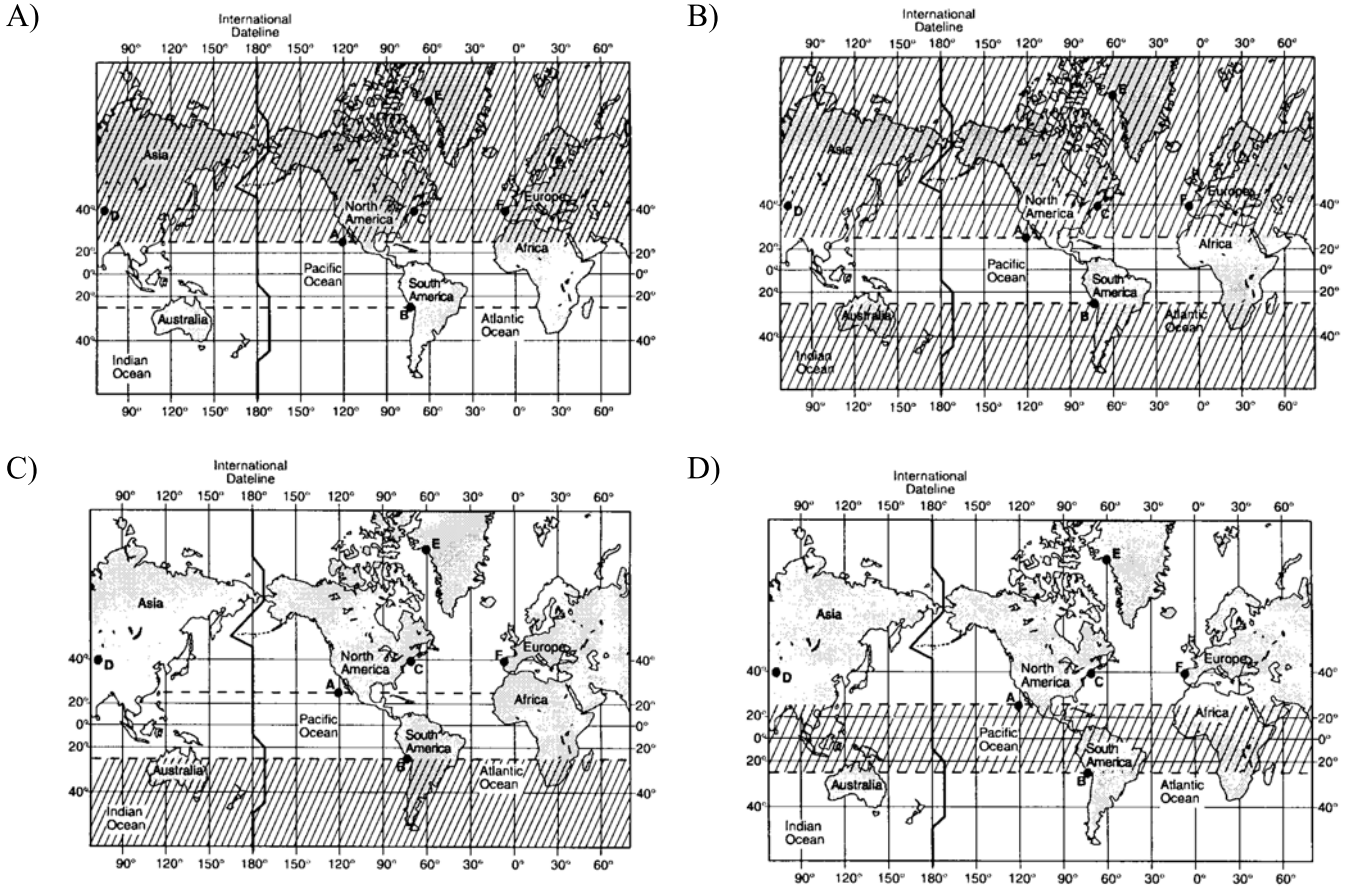
Where is this observer most likely located?

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

12. 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

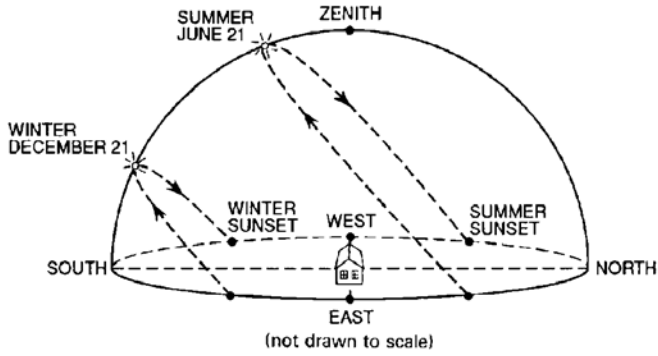
13. In which map does the shaded area correctly represent the part of Earth that receives direct (perpendicular) rays from the Sun sometime during the year?



14. During how many days of a calendar year is the Sun directly overhead at noon in New Jersey?

- A) only 1 day
- B) only 2 days
- C) 365 days
- D) 0 days

15. The diagram below shows the apparent paths of the Sun in relation to a house in New York State on June 21 and December 21.



Which statement best explains the cause of this apparent change in the Sun's path?

- A) The Sun's orbital velocity changes as it revolves around the Earth.
- B) The Earth's orbital velocity changes as it revolves around the Sun.
- C) The Earth's axis is tilted $23\frac{1}{2}^\circ$
- D) The Sun's axis is tilted $23\frac{1}{2}^\circ$

Answer Key
Intro to celestial spheres

1. D
 2. D
 3. D
 4. D
 5. A
 6. A
 7. A
 8. A
 9. B
 10. B
 11. C
 12. A
 13. D
 14. D
 15. C
-