

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Period: \_\_\_\_\_

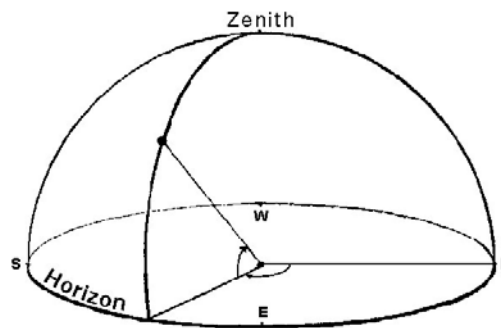
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## Apparent to Actual Motions

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### CLASS NOTES

- Geocentric Universe - \_\_\_\_\_  
\_\_\_\_\_
  - Also called the \_\_\_\_\_ System
  - Stars all rotate around the Earth on a single large sphere at \_\_\_\_\_
  - Planets travel on smaller spheres around their own larger sphere in epicycles
- Problems with the Geocentric Model:
  - Locations of the planets could not accurately be \_\_\_\_\_
  - Changes in the \_\_\_\_\_ of the Moon and Sun could not be explained
- Apparent Motions - \_\_\_\_\_  
\_\_\_\_\_
- Celestial Sphere - the visible portion of the sky that celestial objects appear to travel on
- Celestial Object - any of the natural objects that can be seen in the sky



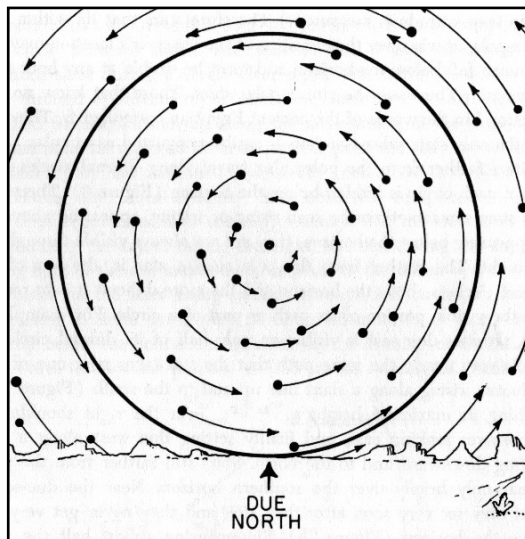
- Horizon - \_\_\_\_\_  
\_\_\_\_\_
- Zenith - \_\_\_\_\_  
\_\_\_\_\_

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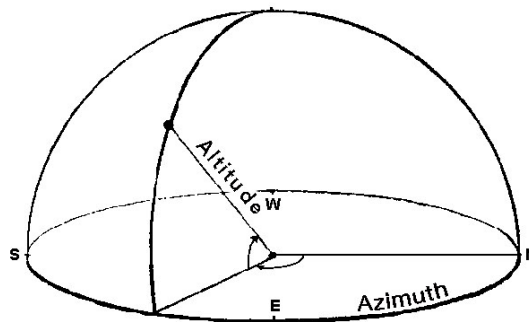
# Apparent to Actual Motions

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- All objects (except Polaris) appear to move across the celestial sphere from \_\_\_\_\_ to \_\_\_\_\_ at  $15^\circ/\text{hour}$  or  $360^\circ/24$  hours
  - Star Trails - long exposure photos of stars as they \_\_\_\_\_ to move across the sky
  - Circumpolar Stars - stars that move around a polar star
  - Polar Star - \_\_\_\_\_
- 



- Locating positions on the celestial sphere:
  - Altitude - angular distance \_\_\_\_\_ the horizon [ $0^\circ$  to  $90^\circ$ ]
  - Azimuth - angular distance \_\_\_\_\_ the horizon measured from due north [ $0^\circ$  to  $360^\circ$ ]

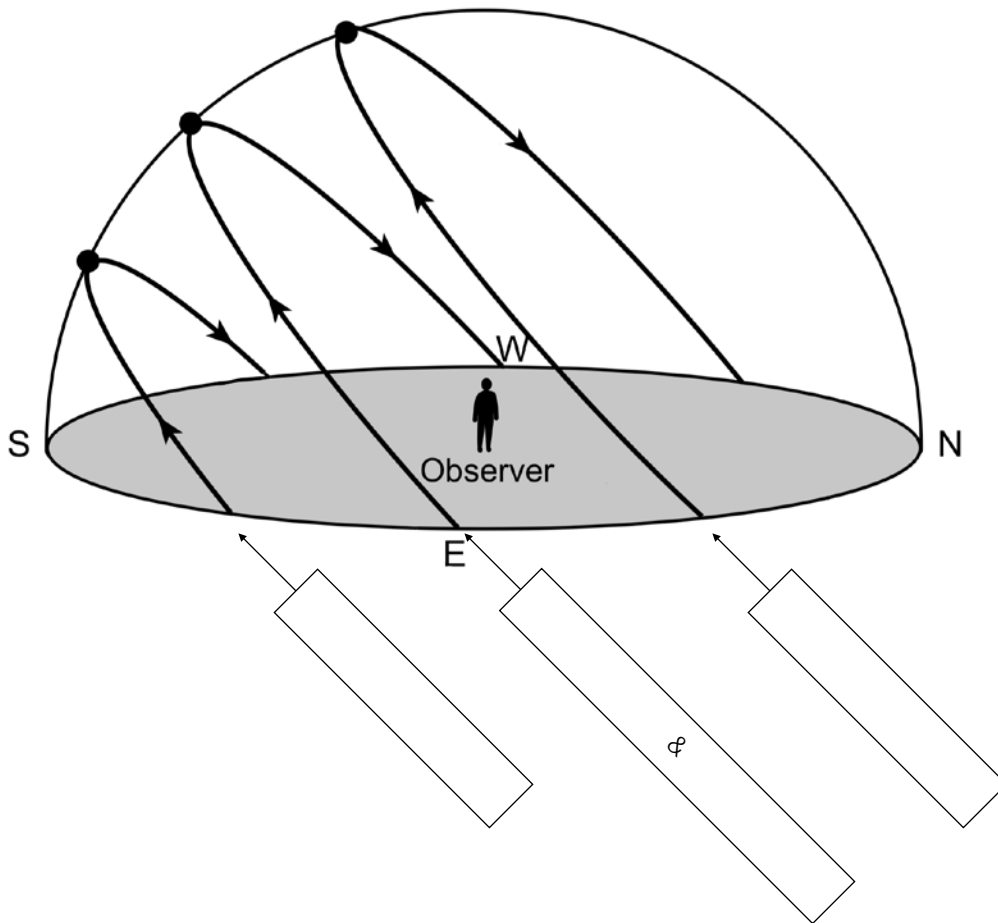


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# Apparent to Actual Motions

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- The Sun's path changes throughout the seasons
  - The greater the Sun's path the \_\_\_\_\_ amount of daylight hours an area receives
  - The shorter the Sun's path the \_\_\_\_\_ amount of daylight hours an area received



- Heliocentric Model - \_\_\_\_\_  
\_\_\_\_\_
  - Also called the \_\_\_\_\_ Model
  - Planet revolve around the Sun in circular paths

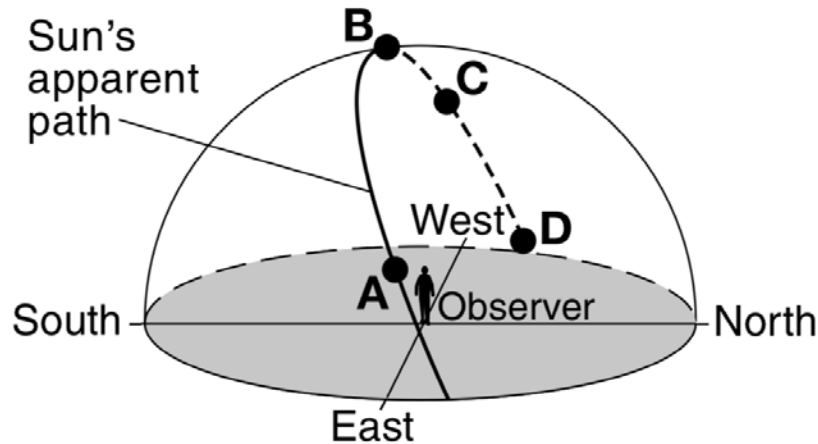
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# Apparent to Actual Motions

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## PART I QUESTIONS: MULTIPLE CHOICE

Base your answers to questions 1 through 4 on the diagram below and on your knowledge of Earth science. The diagram represents the apparent path of the Sun through the sky as viewed by an observer in the Northern Hemisphere. Points A, B, C, and D represent four positions of the Sun.



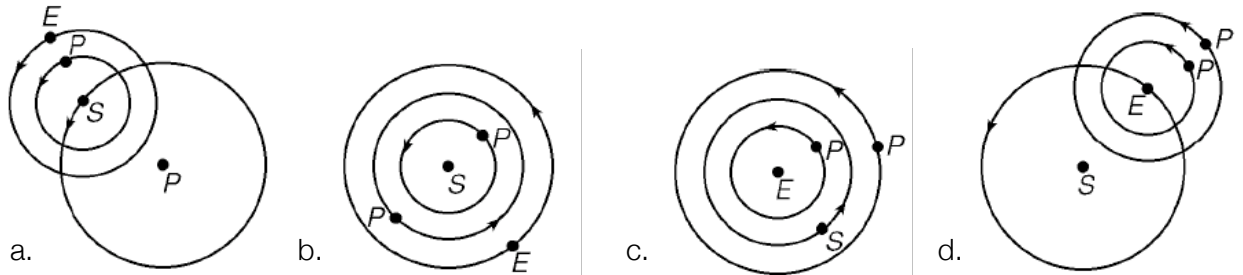
1. This apparent path of the Sun through the sky is caused by
  - a. Earth's revolution around the Sun
  - b. Earth's rotation on its axis
  - c. the Sun's revolution around Earth
  - d. the Sun's rotation on its axis
2. The observer has the longest shadow when the Sun is at position
  - a. A
  - b. B
  - c. C
  - d. D
3. What is the approximate time of day when the Sun is at position C?
  - a. 6 a.m.
  - b. 9 a.m.
  - c. 3 p.m.
  - d. 6 p.m.
4. During which month does the Sun rise north of due east in New York State?
  - a. February
  - b. July
  - c. October
  - d. December

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# Apparent to Actual Motions

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5. The length of time that daylight is received at a location during one day is called the location's
- intensity of insolation
  - angle of insolation
  - eccentricity of insolation
  - duration of insolation
6. Which diagram best represents a geocentric model of the solar system? [Diagrams are not drawn to scale.] KEY: E = Earth; P = Planet; S = Sun



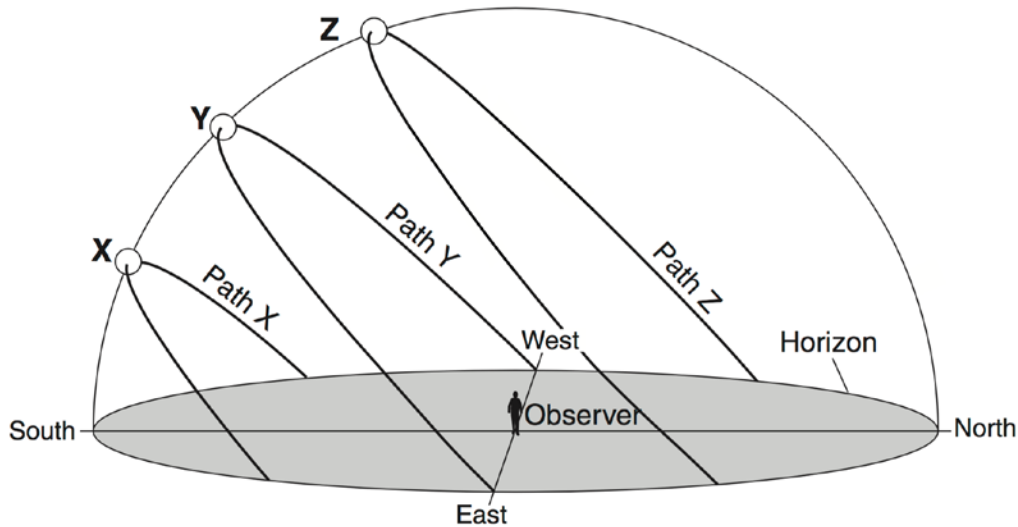
7. As seen from New York State, the noon Sun is
- never directly overhead
  - directly overhead every day
  - directly overhead on the first day of spring and fall
  - directly overhead only on the first day of summer
8. Which statement best describes the geocentric model of our solar system?
- All planets revolve around the Sun.
  - The Earth is located at the center of the model.
  - All planets except the Earth revolve around the Sun.
  - The Sun is located at the center of the model.
9. In New York State, which day has the shortest period of daylight?
- December 21
  - March 21
  - September 21
  - June 21
10. In New York State, which day has the longest period of daylight?
- December 21
  - March 21
  - September 21
  - June 21
11. In New York State, which day has equal amounts of day and night?
- December 21
  - March 21
  - June 21
  - August 21

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# Apparent to Actual Motions

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Questions 12 through 15 refer to the diagram below that represents a plastic hemisphere on which lines have been drawn to show the apparent paths of the Sun on three days at a location in the Northern Hemisphere.



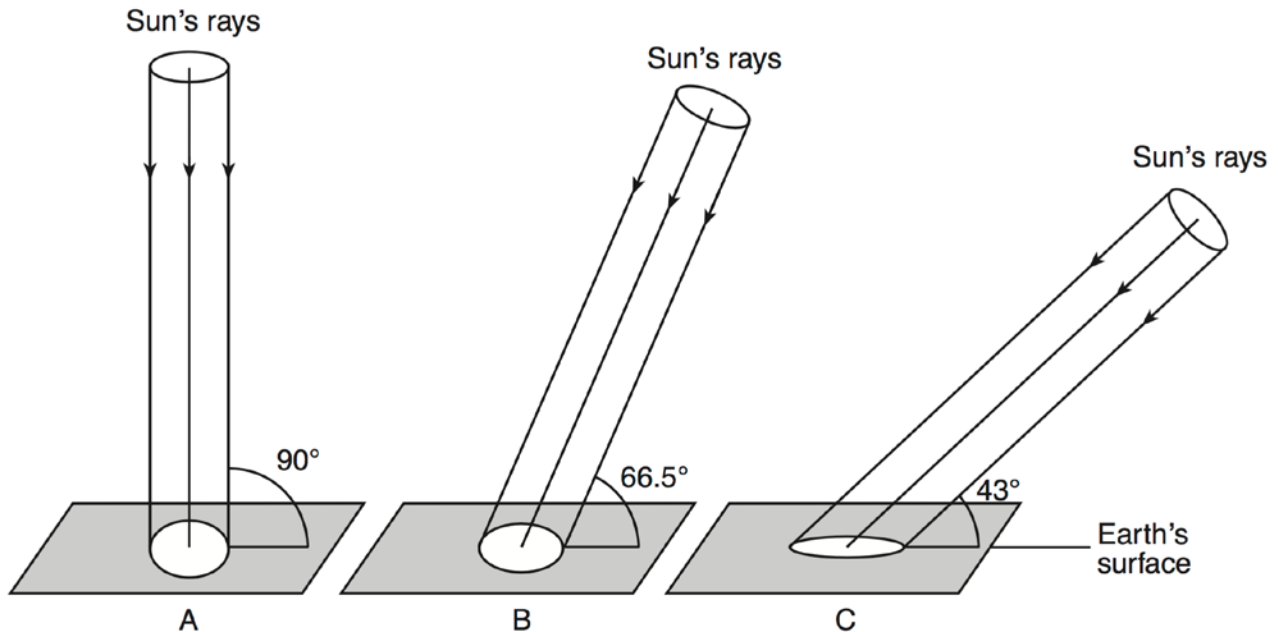
12. What is the rate that the Sun appears to travel along path X from sunrise to sunset.
  - a.  $10^\circ$  per hour
  - b.  $15^\circ$  per hour
  - c.  $23^\circ$  per hour
  - d.  $24^\circ$  per hour
  
13. Which path of the Sun would result in the longest shadow of the Observer at solar noon?
  - a. Path X
  - b. Path Y
  - c. Path Z
  - d. none of the above
  
14. What is one possible date that is represented by Path X?
  - a. December 21
  - b. March 21
  - c. June 21
  - d. September 21
  
15. What is one possible date that is represented by Path Z?
  - a. December 21
  - b. March 21
  - c. June 21
  - d. September 21

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## Apparent to Actual Motions

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Base your answers to questions 16 through 17 on the diagrams below and on your knowledge of Earth science. The diagrams, labeled A, B, and C, represent equal-sized portions of the Sun's rays striking Earth's surface at  $23.5^\circ$  N latitude at noon at three different times of the year. The angle at which the Sun's rays hit Earth's surface and the relative areas of Earth's surface receiving the rays at the three different angles of insolation are shown.



16. As viewed in sequence from A to B to C, these diagrams represent which months and which change in the intensity of insolation?

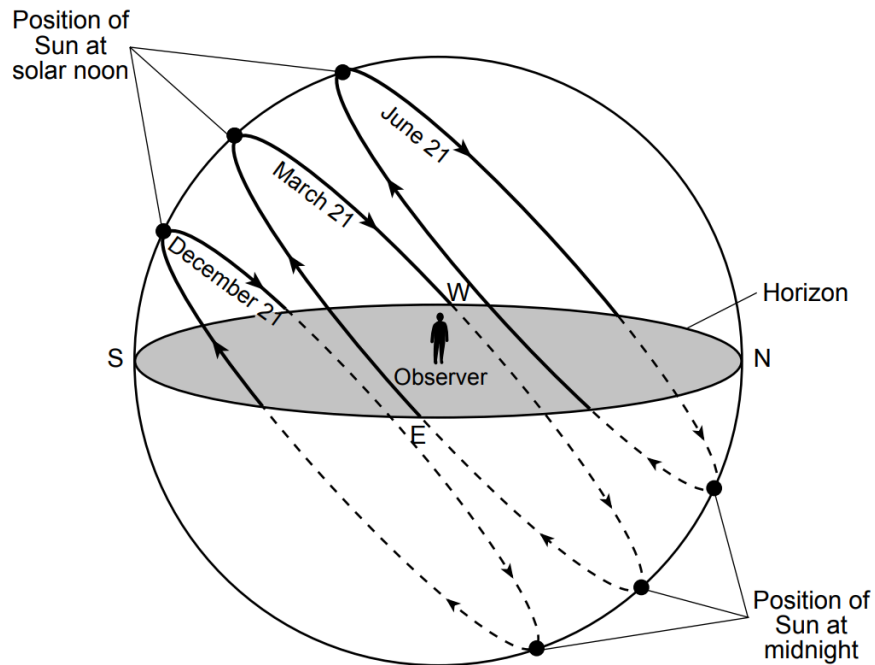
- December  $\rightarrow$  March  $\rightarrow$  June; and decreasing intensity
- December  $\rightarrow$  March  $\rightarrow$  June; and increasing intensity
- June  $\rightarrow$  September  $\rightarrow$  December; and decreasing intensity
- June  $\rightarrow$  September  $\rightarrow$  December; and increasing intensity

17. As the angle of the Sun's rays striking Earth's surface at noon changes from  $90^\circ$  to  $43^\circ$ , the length of a shadow cast by an object will

- decrease
- increase
- increase, then decrease
- decrease, then increase

# Apparent to Actual Motions

Base your answers to questions 18 through 21 on the diagram in your answer booklet and on your knowledge of Earth science. The diagram represents the Sun's apparent daily path for the first day of three seasons at 43° North latitude. The solid lines represent daytime paths as seen by an observer at this latitude. The dashed lines represent the nighttime paths that cannot be seen by the observer.



18. Draw an X, on the diagram, to represent the solar noon position as seen by the observer on May 21.
19. Identify the rate of the Sun's apparent movement, in  $^{\circ}$ /hour, along its path on December 21.
20. Identify the compass direction at which the observer's shadow would point at solar noon on March 21.
21. Using the diagram above, which date has the greatest number of nighttime hours.

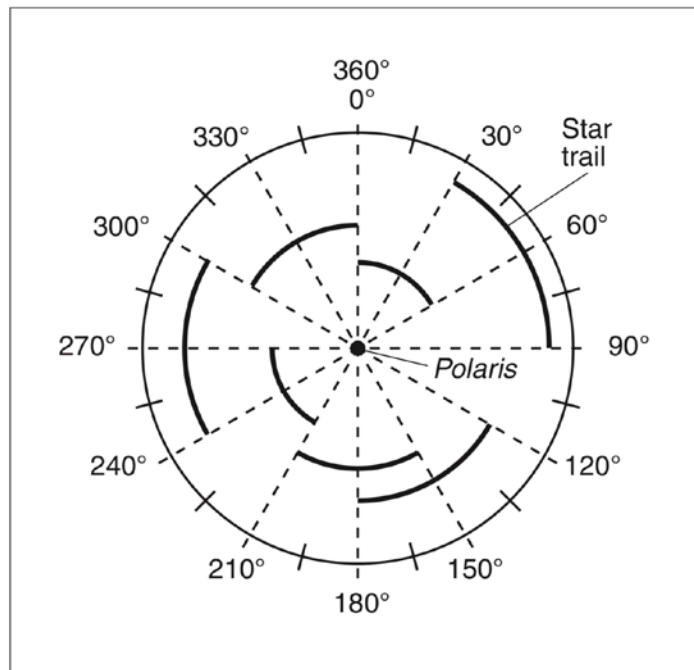


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## Apparent to Actual Motions

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Base your answers to questions 18 through 20 on the diagram below and on your knowledge of Earth science. The diagram represents a time-exposure photograph taken by aiming a camera at Polaris in the night sky and leaving the shutter open for a period of time to record star trails. The angular arcs [star trails] show the apparent motions of some stars.



18. Identify the motion of Earth that causes these stars to appear to move in a circular path.
  
19. Determine the number of hours it took to record the star trails labeled on the diagram.
  
20. What is the altitude of Polaris when it is viewed from the top of New York State's Mt. Marcy.