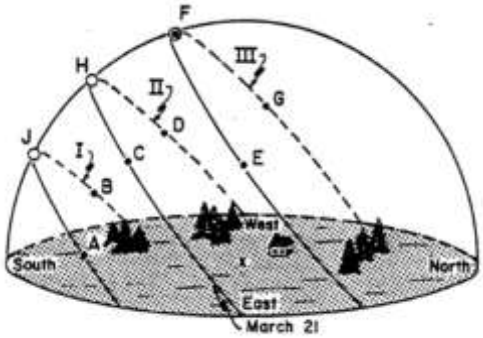
CELESTIAL SPHERE PRACTICE QUESTIONS

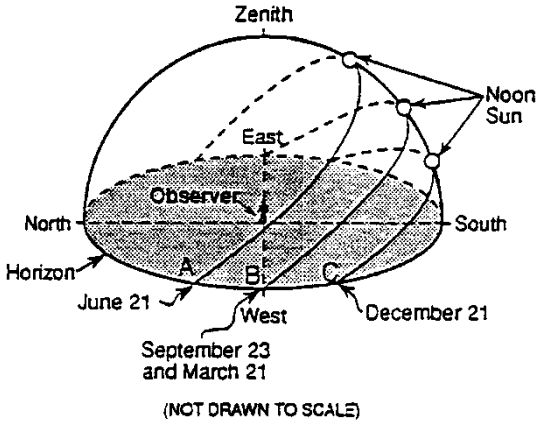
Answers and Explanations



1. (1) – The apparent <u>daily</u> motion of celestial objects, such as the Sun, are a result of the Earth's real motion: rotation. The key word in the question is daily – day and night changes result from the rotation of the Earth toward and away from the Sun.

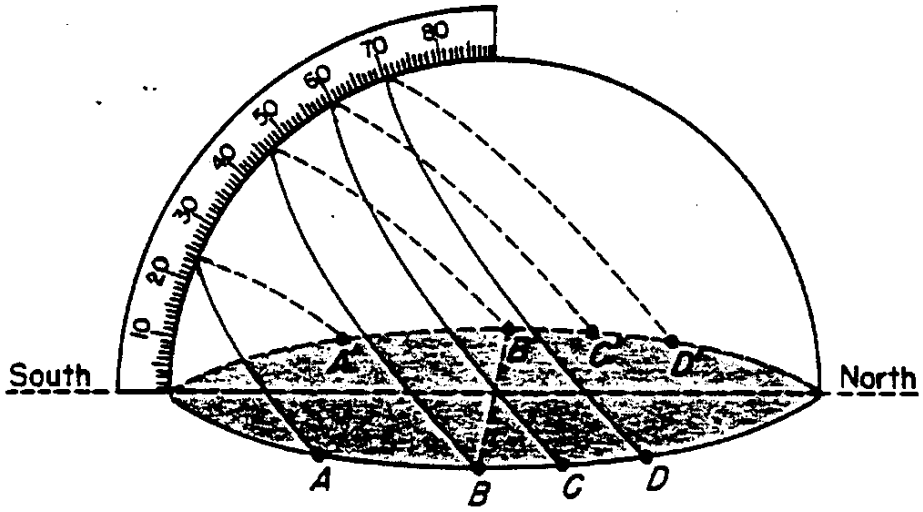
2. (3) – The rate of rotation of the Earth is 15°/hr. Therefore, the Sun and other celestial objects appear to move across the sky at that same rate. 90°/15°/hr yields 6 hours of apparent motion.

3. (4) – The March 21st path starts right where east is labeled in the diagram.



4. (4) – The December path shows that the noon Sun is lower than on any other date. That would mean that shadows would be longest on December 21st.

5. (2) – The noon Sun looks about halfway between the horizon and the zenith. If you use the technique we learned to find the altitude of an object, you would have made a tick mark representing 45° on the southern side of the dome. The noon Sun on September 23rd would be right near this tick mark, so 48° is the best answer.



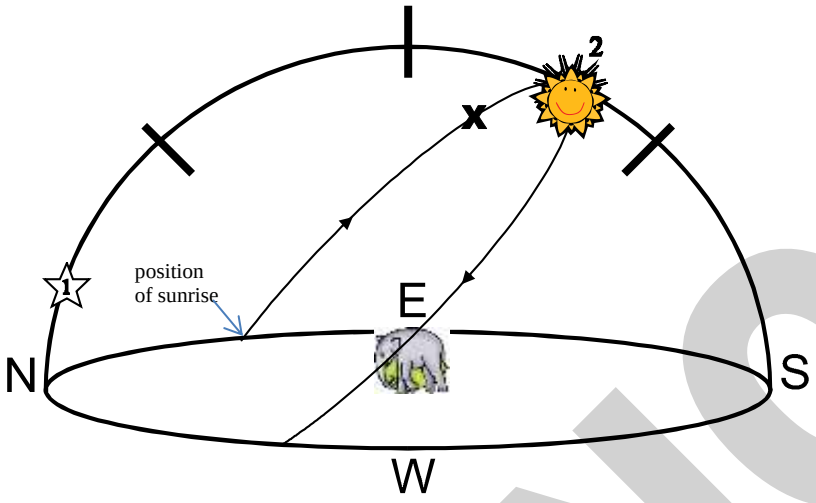
6. (3) – Once again, noon is the highest point on the arc- for C-C' the Sun reaches 60°.

7. (2) – The paths are not labeled, but by reading the introduction to the question, it says that two of the paths are Dec. 21 and June 21. Those would be the two extreme paths – just like in question 9. By subtracting the two altitudes (70°-23°), the answer comes out to 47°.

8. (1) – In this diagram, the western horizon is in the back where A',B',C', and D' are all plotted (due west is exactly where B' is). D' is the point you should look to see the sun set – it is located between north and west.

9. (4) – At noon (12:00pm), the Sun is highest in the sky and therefore would create the shortest shadows for objects on Earth.

Use the diagram below to answer questions 10 - 18.



10. What is the altitude of star 1? **20°**

11. What is the azimuth of star 1? **North (it's on the north line)**

12. What is the azimuth of sunrise? **NE**

13. What time of day is represented by this diagram? **solar noon (or 12:00pm)**

14. If the total degrees of arc for this day is 210 degrees, how many daylight hours would be experienced on this day? **14 hours (210° / 15°/hr)**

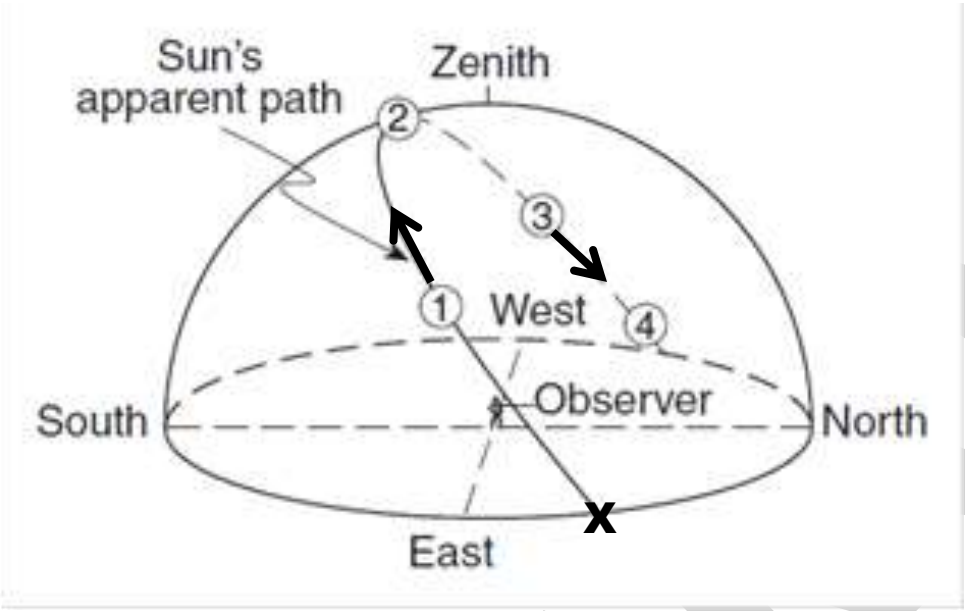
15. What is the altitude Sun at position 2? **60°**

16. What direction would the elephant's shadow point at the time shown in the diagram? **north (the Sun is in the south)**

17. If the Sun was located at position X, what time of day would it be? **10:30am (anything between 9:30-11:30am)**

18. What would the azimuth of the Sun be if it was located at position X? **southeast**

Use the diagram below to answer questions 19 – 30.



19. Place an x in the correct place to indicate the position of sunrise on this day. **(see position of "x" in the diagram)**

20. Draw two arrows on the arc path showing the direction that the sun appears to move along the arc path. **(see arrows in the diagram)**

21. What is the azimuth of the sunrise position that you indicated? **northeast**

22. Which numbered position represents the sun setting? **4**

23. Which numbered position represents solar noon? **2**

24. What is the altitude of the Sun when it is solar noon? **75°**

25. What is the azimuth of the Sun when it is solar noon? **south**

26. What is the approximate time of day when the Sun is at position 1? **9:00am**

27. What is the azimuth of the Sun when it is at position 3? **west (or just a little north of west)**

28. When the Sun is at position 2, in which direction would the observer have to look to see his shadow? **north**

29. What happens to the length of the observer's shadow as the Sun proceeds along its daily arc path from position 3 to 4? **Since the Sun is setting and getting lower in the sky, the shadow length would increase (shadow would get longer)**

30. What happens to the length of the observer's shadow as the Sun proceeds along its daily arc path from position 1 to 3? **Since the Sun is rising from position 1 to position 2, and then setting from position 2 to position 3, the shadow length would first decrease, then increase. (shadow would get shorter, then longer)**