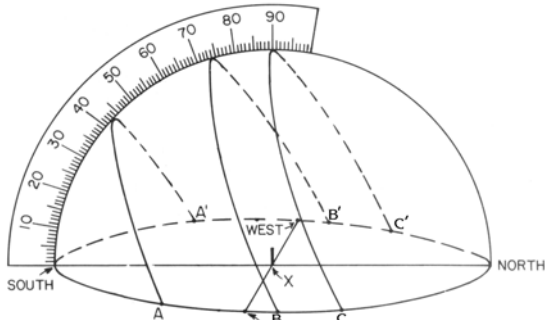
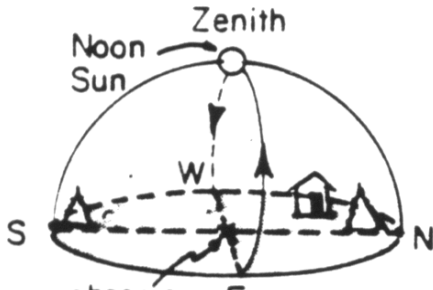


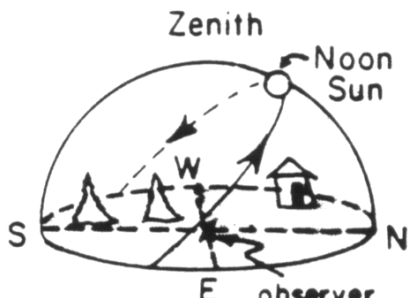
Celestial Sphere Diagrams We Know and Love



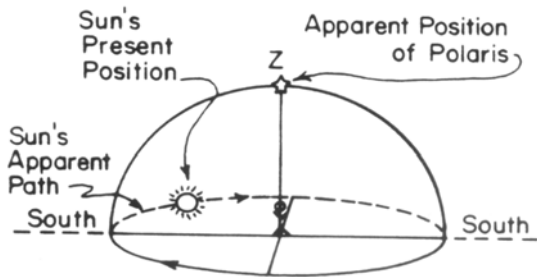
On this diagram the sun is in the southern sky at noon. This is a sure sign that this sphere is for a location in the northern hemisphere. The longest path, which is probably June 21st, shows the noon sun at an altitude of 90E. Where is the noon sun at 90E on June 21st? Right, at a latitude of 23.5EN, the Tropic of Cancer.



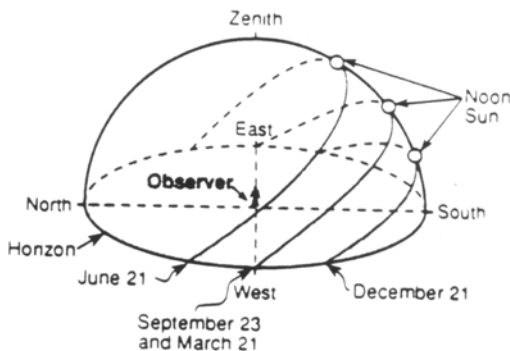
In this diagram the sun rises due east and sets due west. That only happens on an equinox. Notice that at noon the sun is directly overhead at an altitude of 90E. Where would you have to be for the sun to be directly overhead on an equinox. Right again! On the equator, 0E latitude.



Notice that the noon sun is in the northern sky. This is a sure sign that this location is in the southern hemisphere

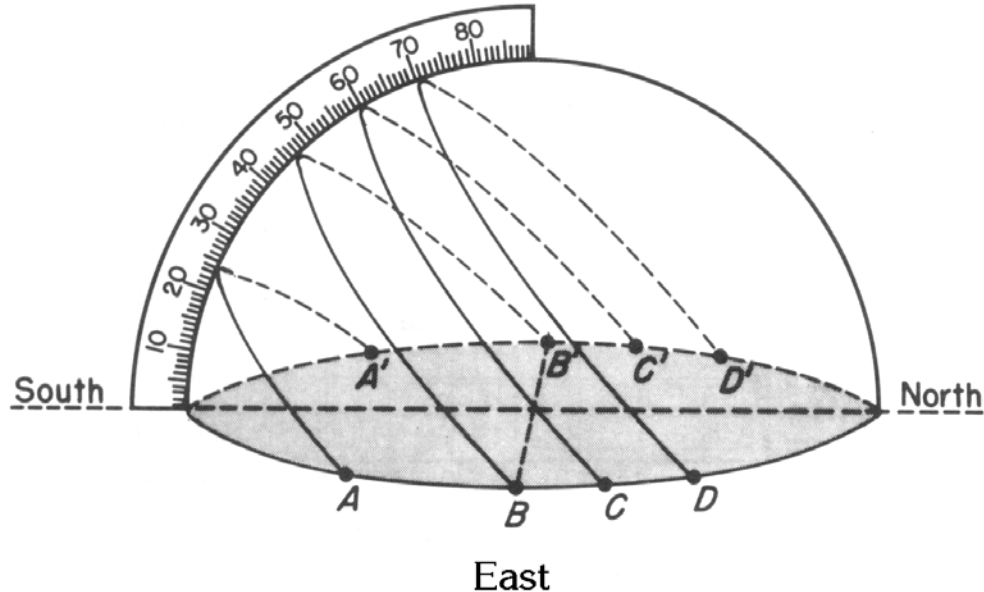


This is a very strange diagram. The sun seems to be on the horizon and it's path seems to go round and round without rising or setting. What gives away the answer is the position of Polaris. Where would you have to be in order for Polaris to be directly, 90E overhead. At the north pole. Notice also that all directions are south. The day must be March 21st when the sun rises or September 21st when the sun sets. On these days it's path circles just on the horizon.



At first glance this looks like a location in the southern hemisphere. It seems to be the reverse of the diagrams we are used to. But notice that the noon sun is in the southern sky. This diagram is for a mid-latitude location in the northern hemisphere, such as New York. The directions are reversed from way they are usually drawn. Don't be fooled.

Using the Celestial Sphere



- > This celestial sphere diagram shows the path of the sun as it moves through the sky on 4 different days of the year at a location in New York State.
- > You, the observer, are standing in the gray, shaded area at the intersection of the 2 dotted lines.
- > The top of the sphere (where the protractor is located) represents the highest, solar noon, altitude of the sun for that day.
- > To see the sun at noon on any day of the year, the observer must look to the south.

The Paths:

- 1) Path D-D': It is the longest path. It will take the sun the longest time to travel this path. Therefore this is the path the sun takes on the day with the *greatest duration of insolation* (most hours of daylight), June 21st, the first day of summer in the northern hemisphere.
 - > The sun rises *north* of east and sets *north* of west.
 - > The noon altitude of the sun is about 71.5E, the highest noon altitude for any day of the year.
 - > Since the sun is high in the sky at noon, it's insolation is *most direct* (strongest).
 - > A stick placed in the center of the field (where the observer is located) will cast the shortest noontime shadow for any day of the year. At noon, that shadow will always point north.
- 2) Path B-B': Notice that the sun rises *due east* and sets *due west*. It's path divides the field into two *equal* halves. This is the path of the sun on the vernal (March 21st) and autumnal (Sept. 23rd) equinoxes.
 - > The path of the sun is shorter than it was on June 21st, so the *duration of insolation* is less. On either equinox there are 12 hours of day and 12 hours of night for every location on Earth.
 - > The noon altitude of the sun is about 48E. The insolation is less direct than it was in June.
- 3) Path A-A': It is the shortest path. The sun will be in the sky the fewest hours on this day (the *shortest duration of insolation*). It is December 21st, the first day of winter in the northern hemisphere.
 - > The sun rises *south* of east and sets *south* of west.
 - > The noon altitude of the sun is 24.5E, the lowest noon altitude for any day of the year.
 - > Since the sun is low in the sky at noon, it's insolation is *least direct* (weakest).
 - > A stick placed in the center of the field will cast the longest noontime shadow for any day of the year.
- 4) Path C-C': Since this path is between the equinoxes and June 21st, it could be either of two dates. It could be between June 21st and September 23rd, probably a day in mid August. Or it could be between March 21st and June 21st, probably a day in mid May.