The Sun's Apparent Motion in the Sky

Name: Date:

What is the latitude and longitude of your town? *The value should be in degrees and minutes*. Suggestion: use the Internet, cell phone, or available map to find these values.

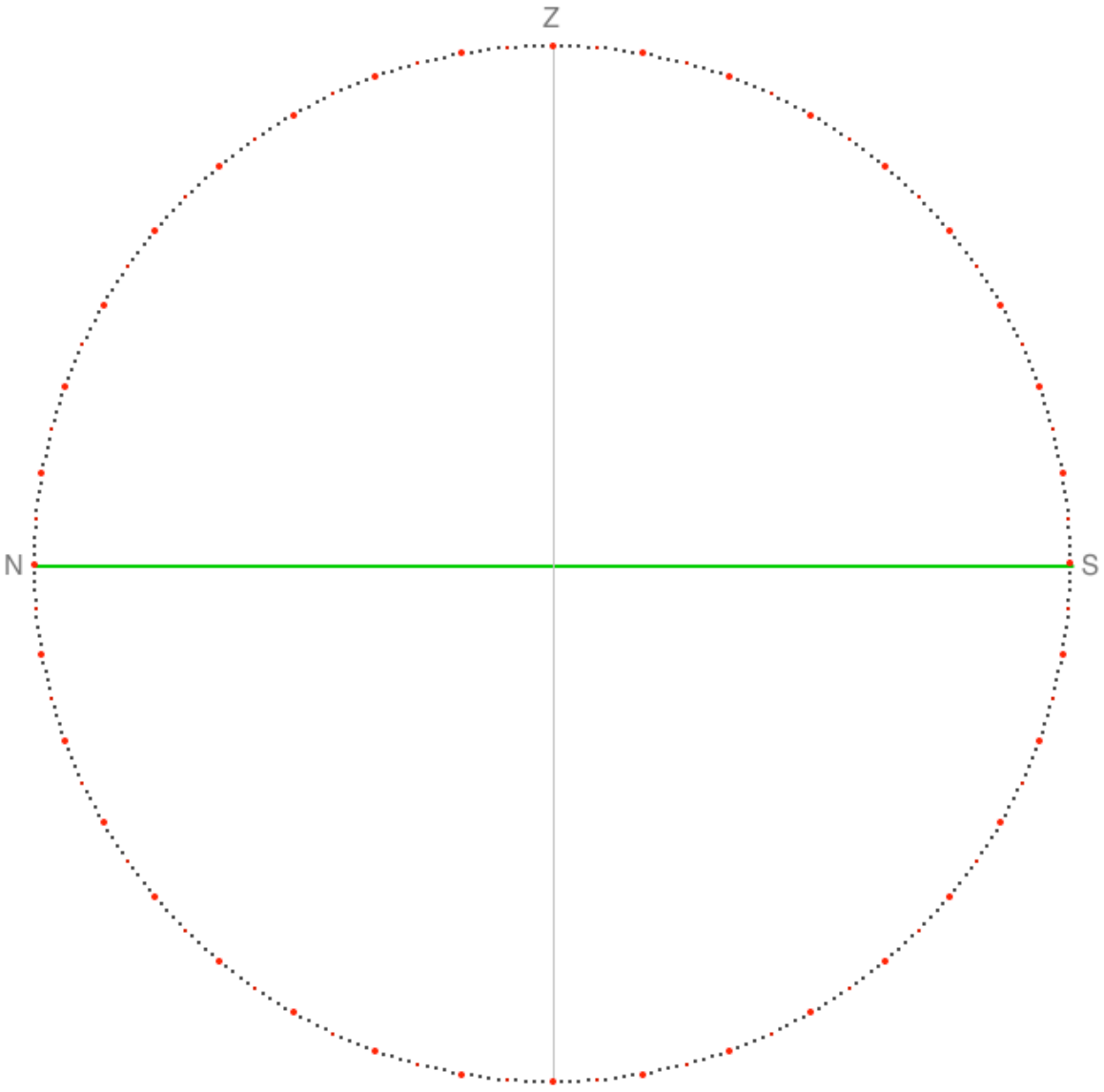
Use Sun-Earth Connection software at sciencepickle.com/sun-earth.html

Draw free hand in 3D and *label* the paths of apparent motion of the sun in the sky (also called *declination circles*) for *your town* the following 4 days: a) summer solstice (June 21), b) vernal equinox (Mar 21), c) winter solstice (Dec 21), and d) autumnal equinox (Sep 21). Be as detailed as possible. Also, complete the following table:

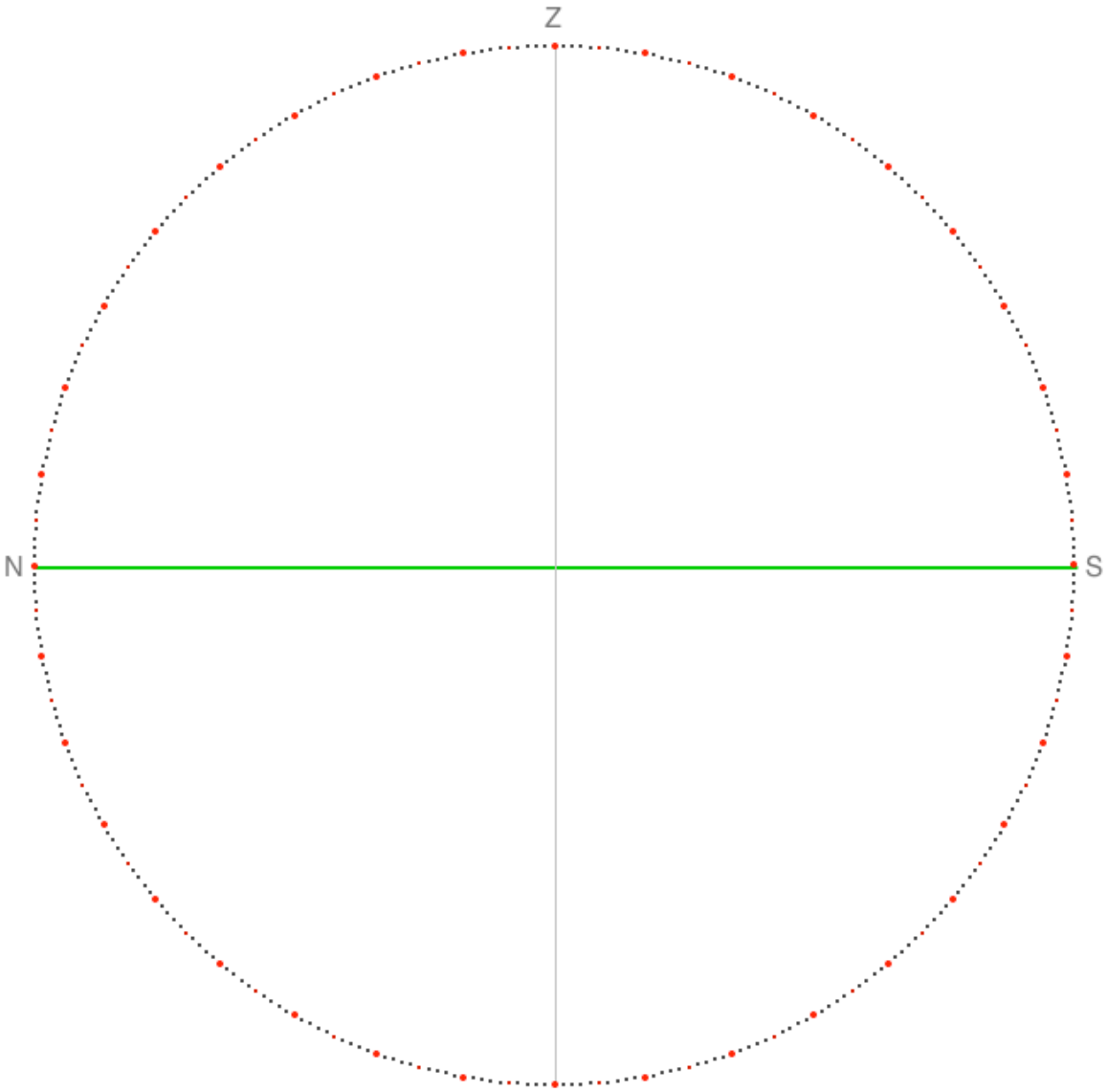
Date	Amount of Daylight = Sunset – Sunrise Times	Location of Sunrise	Location of Sunset
Mar 21 Vernal Equinox			
Jun 21 Summer Solstice			
Sep 21 Autumnal Equinox			
Dec 21 Winter Solstice			

Redraw the 4 declination circles from the previous page onto the N/S template below. “Z” is the zenith, the point directly overhead a person standing in the middle of their horizon (the green line). North is to the left, south to the right, so looking into the paper at the intersection of zenith and the horizon is east, and west extends out of the paper. *Suggestion*: Use a ruler.

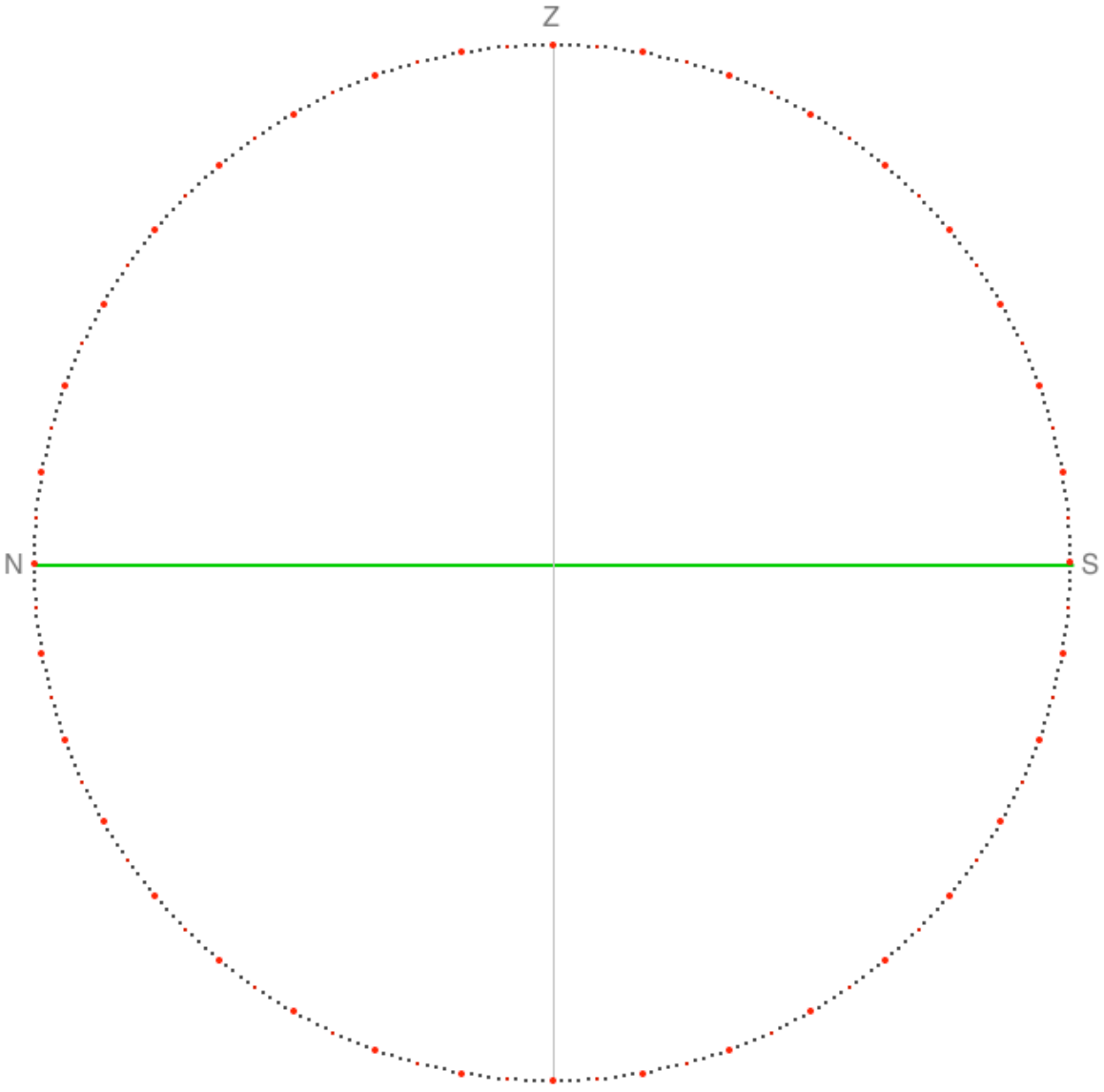
Label the date of each declination circle and mark and label the locations of sunrise, sunset, local noon and local midnight for each declination circle. Show what part of the declination circle represents day light hours and what represents darkness.



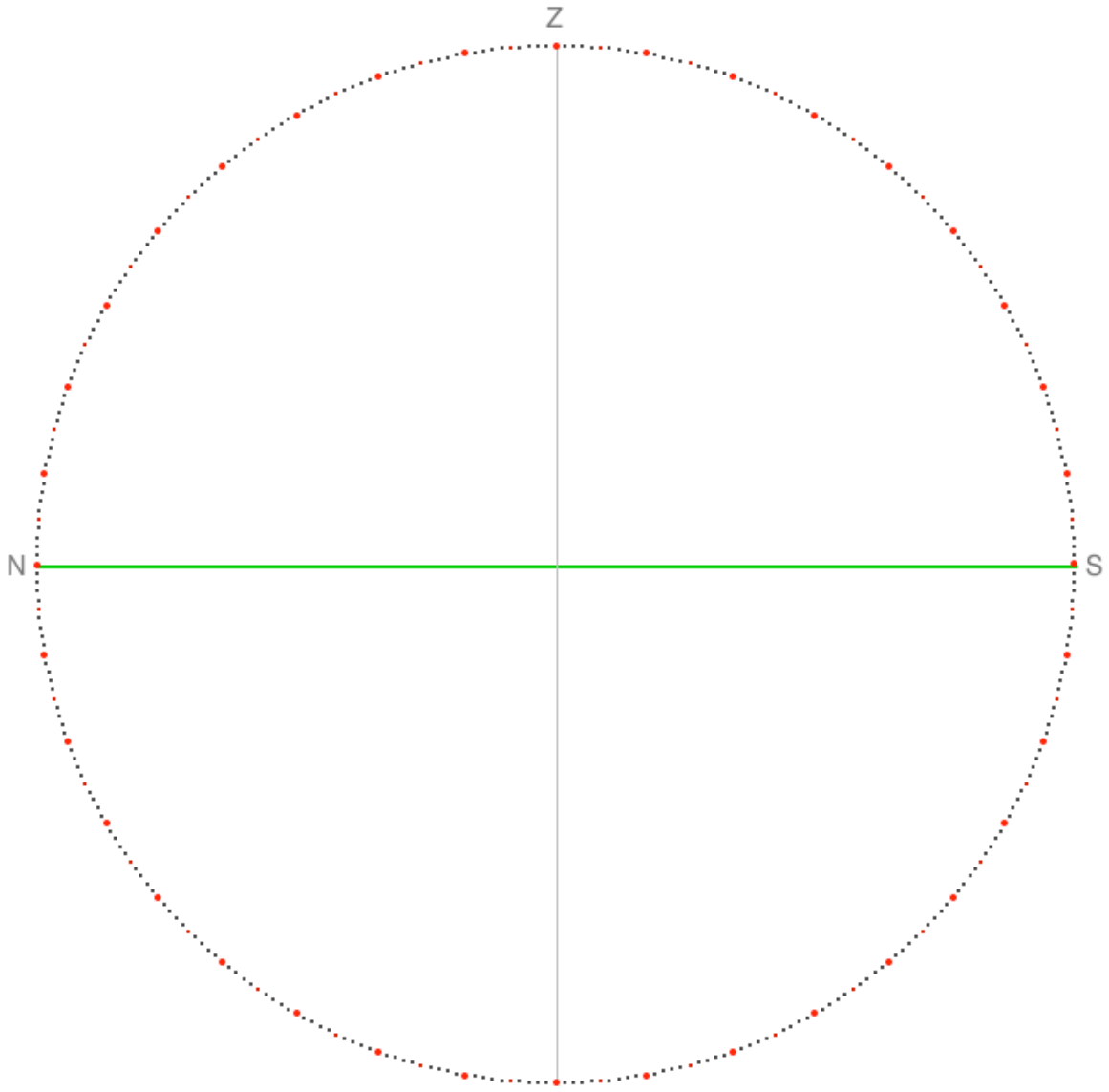
Draw and *label* the declination circles for the *Equator (0°)* at the June 21 solstice, March 21 and Sep 21 equinoxes, and Dec 21 solstice. Mark and label the locations of sunrise, sunset, local noon and local midnight for each declination circle, and show what part of the declination circle represents day light hours and what represents darkness.



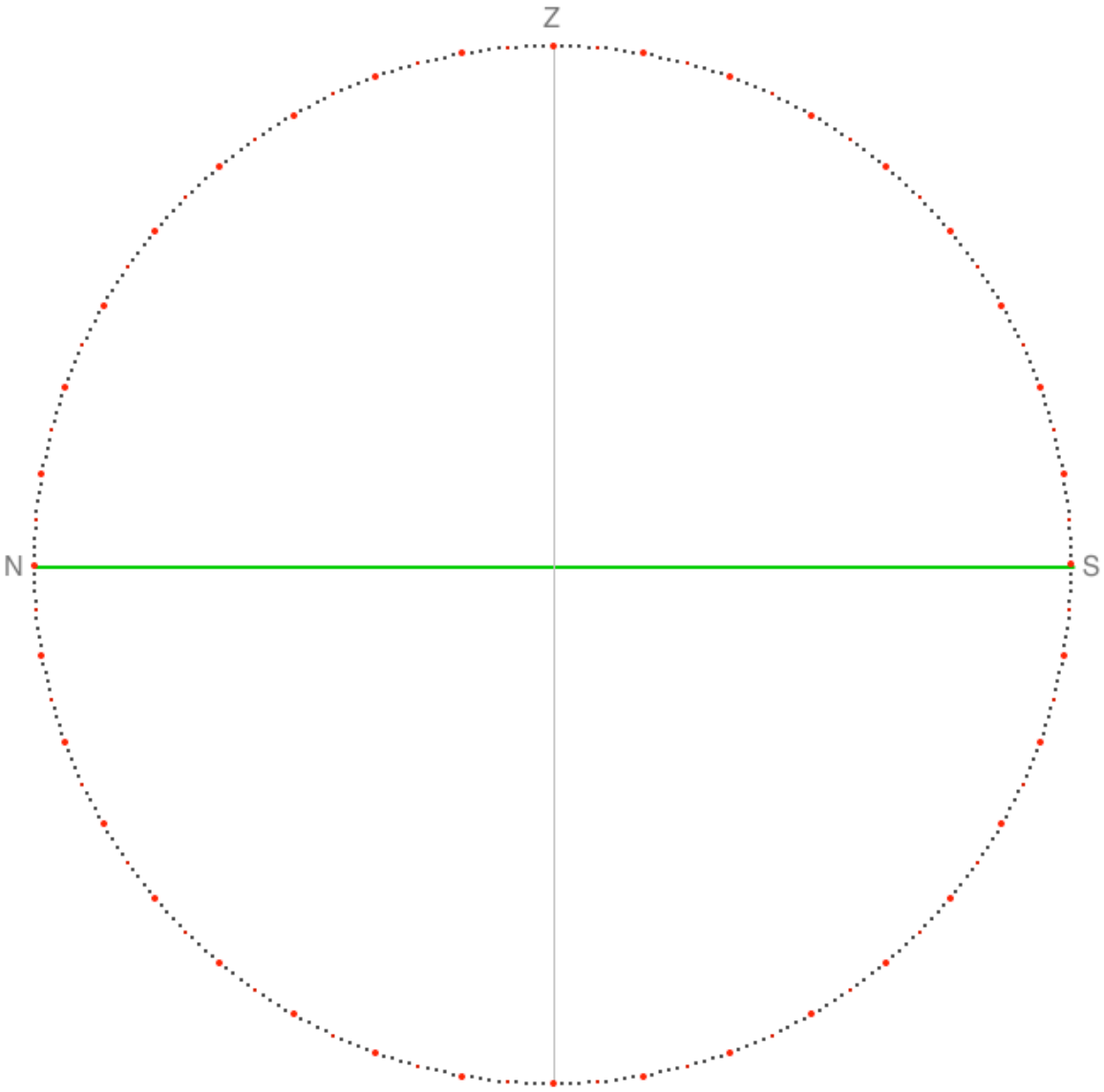
Draw and *label* the declination circles for the *Tropic of Cancer* (23.5°N) and the *Tropic of Capricorn* (23.5°S) at the June 21 solstice, March 21 and Sep 21 equinoxes, and Dec 21 solstice. Mark and label the locations of sunrise, sunset, local noon and local midnight for each declination circle, and show what part of the declination circle represents day light hours and what represents darkness. How are the two sets of similar? Different?



Draw and *label* the declination circles for the *Arctic Circle* (66.5°N) and the *Antarctic Circle* (66.5°S) at the June 21 solstice, March 21 and Sep 21 equinoxes, and Dec 21 solstice. Mark and label the locations of sunrise, sunset, local noon and local midnight for each declination circle, and show what part of the declination circle represents day light hours and what represents darkness. How are the two sets of similar? Different?



Draw and *label* the declination circles for the *North Pole* (90°N) and the *South Pole* (90°S) at the June solstice, March equinox, December solstice, and September equinox. Mark and label the locations of sunrise, sunset, local noon and local midnight for each declination circle, and show what part of the declination circle represents day light hours and what represents darkness. Tip: redraw the location of North and South for each latitude in the diagram below. How are the two sets of similar? Different?



For what latitudes does the Sun rise *exactly* in the East and set *exactly* in the West? When this occurs how many hours of sunlight does that latitude experience?

For any latitude, how does the amount of daylight hours during the summer solstice for that hemisphere (June 21 for Northern Hemisphere latitudes and Dec 21 for Southern Hemisphere latitudes) compare to the amount of hours during the winter solstice for that hemisphere?

For any latitude, how does the location of sunrise on the horizon during the summer solstice for that hemisphere compare to the winter solstice location?

For any latitude, how does the location of sunrise on the horizon compare to the location of sunset during any given day?

For any latitude, how does the altitude of the sun above the horizon at local noon during that hemisphere's summer solstice compare to the altitude of the local noon sun during the winter solstice?