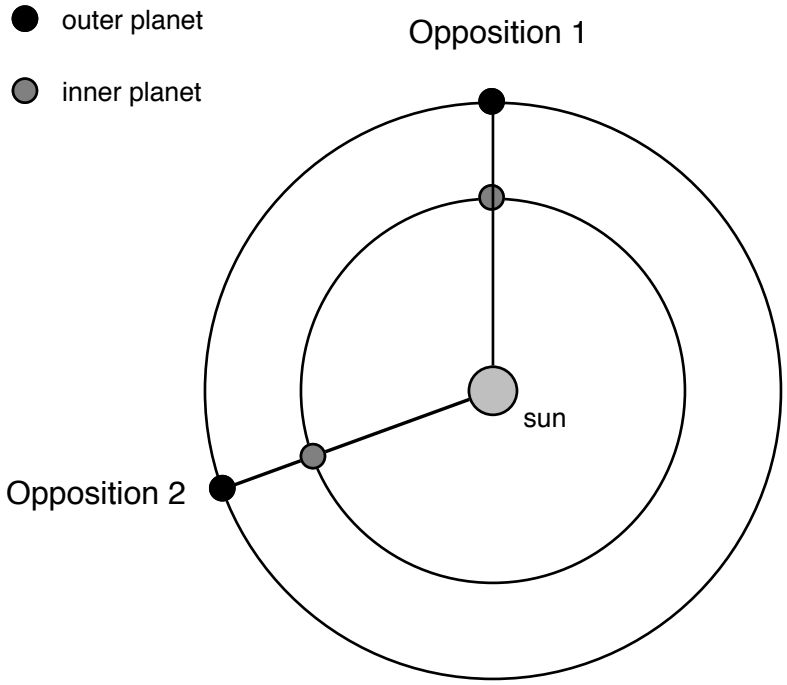
Finding the Sidereal Period

The synodic period is the time it takes for the earth, sun and planet to achieve the same relative positions to each other. The *sidereal* period is the time it takes a planet to go around the sun once. It is very easy to measure the synodic period directly from earth; it is impossible to measure the sidereal. However, it is very easy to calculate the sidereal period from the synodic.

A planet is in *opposition* when it is exactly opposite the sun; one can draw a straight line from the sun through the earth and then through the planet. The time it takes for a planet to go from opposition to opposition is the synodic period of that planet. Because an inner planet always goes faster than an outer planet, the synodic period is simply the time it takes the inner planet to lap the outer planet.



1. For outer planets, derive an equation that equates the sidereal period with the synodic period.

2. For inner planets, derive an equation that equates the sidereal period with the synodic period.

3. Using your formulas, calculate the sidereal periods for the following planets:

	Mercury	Venus	Mars	Jupiter	Saturn
Synodic Period (days)	116	584	780	399	378
Sidereal Period					