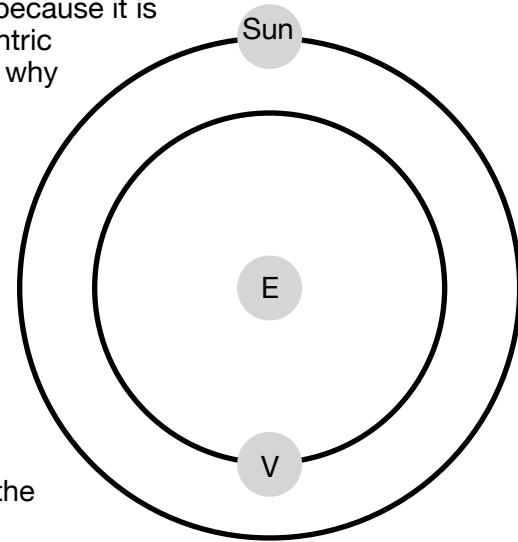


## Phases of Venus: AST301 — Prof Steven Finkelstein

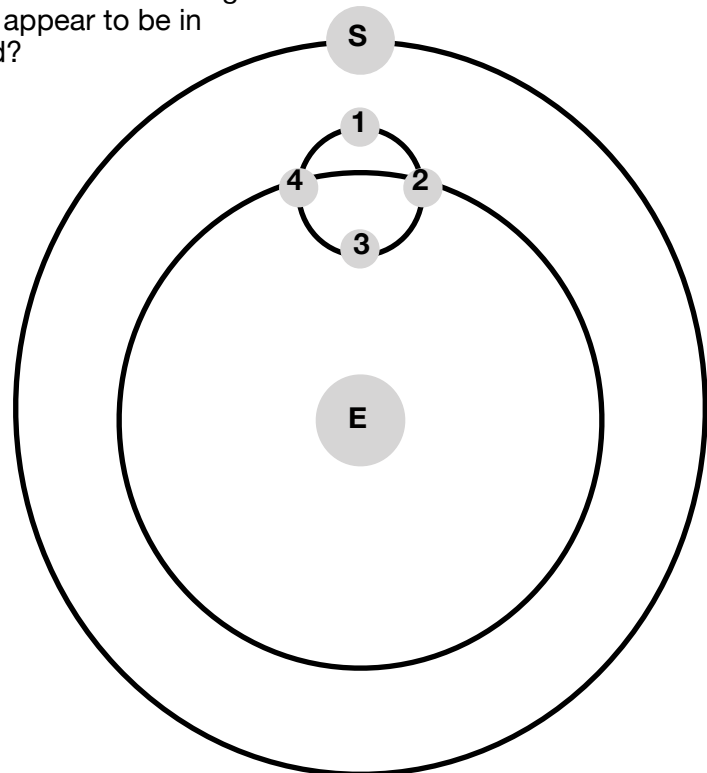
Galileo was able to provide observational evidence in support of Copernicus' model of the Solar System by using his telescope to observe the changing phases of Venus. In this activity, you will explore which phases should be visible from Earth for both the geocentric, Ptolemaic model, and the heliocentric Copernican model.

**1)** Venus is often referred to as the “morning star” or “evening star”, because it is visible close to the Sun in our sky. To the right is a sketch of a geocentric model of the Solar System. Is this a possible configuration? Why or why not?



**2)** When would you expect to see Venus high in the sky at midnight? Consider the times of day when you have seen Venus, and where in the sky it is located.

**3)** We of course can understand why Venus appears where it does, because Venus orbits around the Sun closer than the Earth does, so it will always be somewhat close to the Sun in our sky. The ancients didn't know this of course, so they constructed their model such that Venus always stayed on its ring coincident with the Sun, with Venus prograde and retrograde motion due to movement along its secondary ring, shown below. Using the geocentric diagram below, which phase would Venus appear to be in when observed from Earth at the four points indicated?



- 1)
- 2)
- 3)
- 4)

For the remainder, we'll now assume the correct model of a heliocentric Solar System.

**4)** Imagine that Venus is in its full phase today. If we could see it, at what time would the full Venus be highest in the sky?

**5)** When would a new Venus be highest in the sky?

**6)** Now, using the correct, heliocentric diagram below, denote which phase Venus would appear to be in when observed from Earth.

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)

