

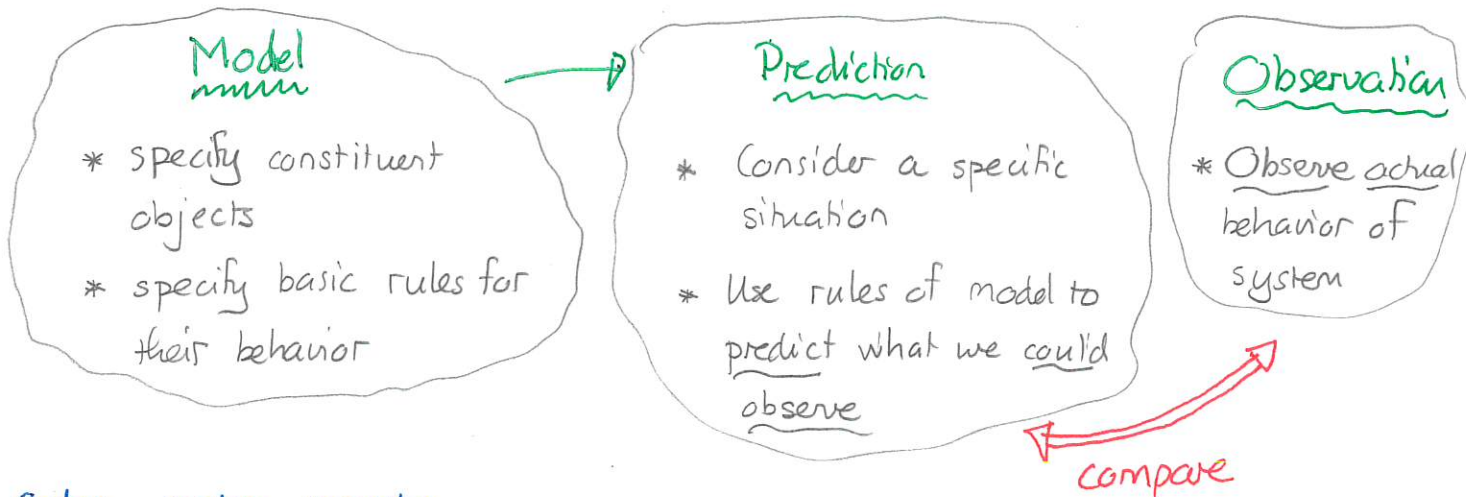
Fri: Read 2.1 → 2.4

HW by 5pm

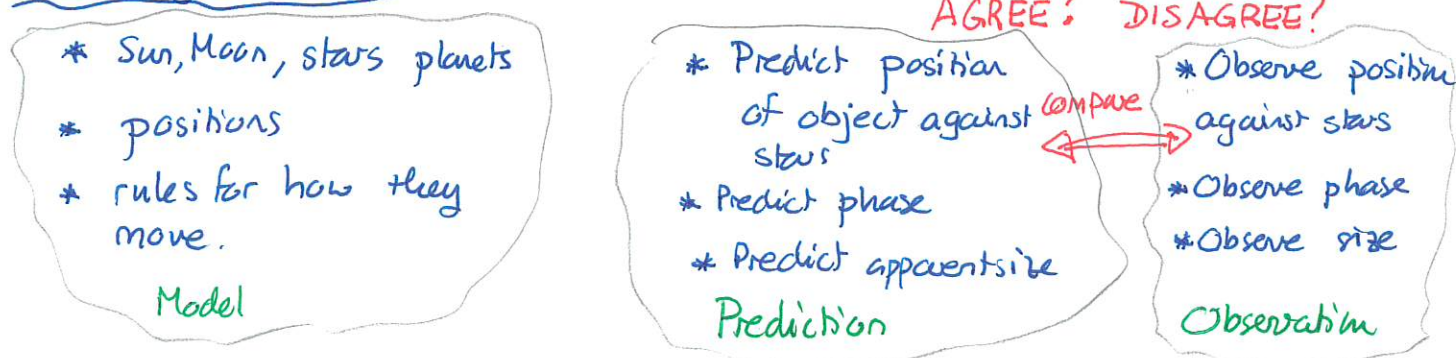
- * Turn in paper copy
- * Last question is reading exercise, scans of text are on D2L course website.

Solar system models

In order to understand and predict the behavior of the solar system we need to create models (simplified "pictures") of the system and use these models to predict behavior that could be observed. We then need to check the prediction against the observations. The general scheme is:



Solar system examples



Note that, for objects in the solar system, the possible observations we consider are:

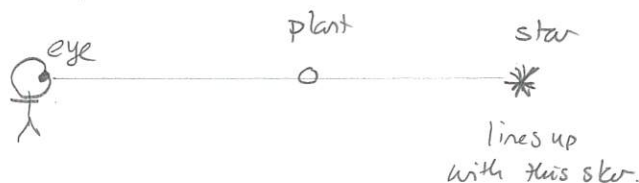
- 1) the apparent position of the planet against the background stars, i.e. where the planet appears to be when viewed against the stars.

DEMO ~~Move~~ ^{Hold} finger against backdrop on board.



finger appears to be in front of 2

We draw a line of sight from the eye to the planet and extend to the background.

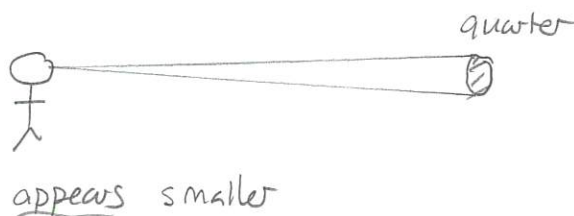
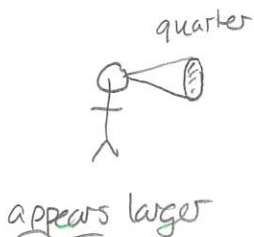


- 2) the apparent motion of a planet against the background stars. This is how the apparent position changes and depends on the motion of the planet and the observer

DEMO: * Move finger against background
 * Move heads (students) - observe change in apparent position.

DEMO: UNM Retrograde motion - Earth Venus - highlight actual Venus
 apparent Venus.

- 3) the apparent size of an object. How large it appears to be



- 4) phases of an object.

The geocentric (Earth at center) and heliocentric (Sun at center) models generally make different predictions about these observations

Quiz!

Concepts of Physics: Group Exercise 1

30 August 2023

Names: _____

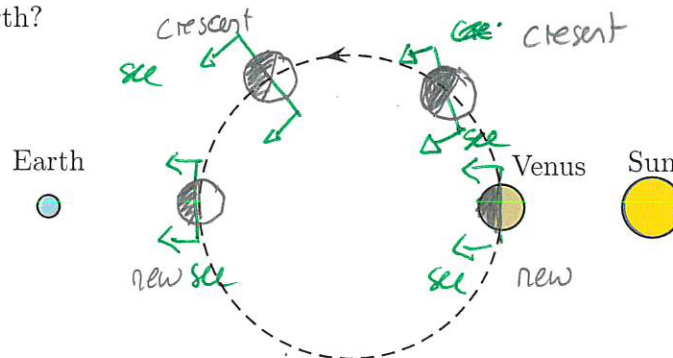
1 Rotating object

Take a rectangular object with three sides of different lengths: a box or a phone is a good example. Try to flip the object in such a way that it rotates and does not “tumble.” Try this for three distinct axes. Is it easier to do this about some axes rather than others? Have you ever noticed this before? Where? *The instructor will provide some assistance.*

2 Phases of Venus

The planet Venus can be observed through a telescope and one would expect that it could display phases similar to the Moon. We aim to use various models to predict the possible phases of Venus that are visible from the Earth.

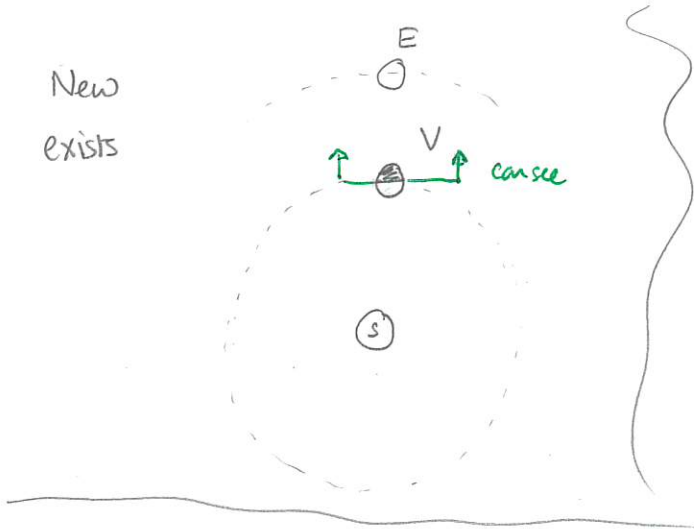
- Consider a heliocentric model in which Venus and the Earth orbit the Sun in circles. Venus is closer to the Sun and Earth is further from the Sun. Sketch the positions of Earth, Venus and the Sun that might result in a range of phases of Venus, including full, new and various crescent phases. Does this model predict that the entire range of phases visible from Earth?
- In Ptolemy’s model of the solar system, with Earth at center, Venus effectively orbits in a circle between the Sun and Earth. This is illustrated below (the scales are exaggerated). Sketch Venus in several positions as it orbits and use this to determine which phases of Venus are visible from Earth. Does this model predict that the entire range of phases visible from Earth?



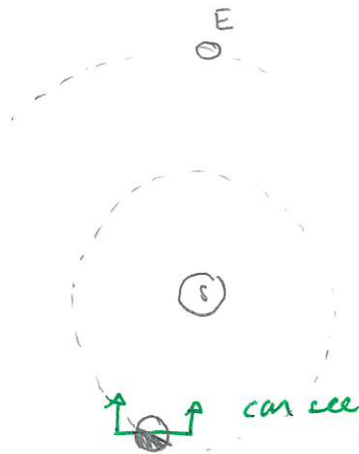
The model predicts new and slight crescents. Nowhere close to half

Q2 Answer

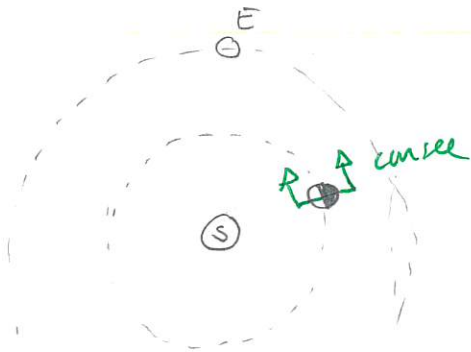
a) New exists



Almost Full exists



Half exists



The model predicts that we can see nearly the entire range

new \rightarrow crescent \rightarrow half \rightarrow full

DEMO: ESO Venus phases