Name: _____ Date _____

Retrograde motion of Venus

Venus favors the bold --Ovid

Overview

* To observe retrograde motion.
* To understand the times scales involved.

Adapted from the planetarium lab at the University of Michigan, with minor modifications.

Introduction

The ecliptic crosses the sky from the eastern to the western horizon (though not from due east to due west). Your latitude determines how far north or south the ecliptic is. It is defined as the path of the Sun through the stars, or the projection of the Earth's orbit on the stars. The Sun, Moon, planets, and many asteroids move to the east or toward the west along it. Most objects travel eastward most of the time, so this is considered the "normal" direction and is called prograde. Occasionally, they will appear to stop, turn around and go backwards for a short time. This is called retrograde motion.

Retrograde motion was incredibly difficult but not impossible to explain in the geocentric universe. Explaining the behaviors of the planets required more and more complicated sets of eccentrics, deferents and epicycles. However, when Kepler finally devised his laws of planetary motion, retrograde motion became a simple phenomena explained simply as the appearance of backward motion due to the Earth passing or being passed by the other planet.

In this lab, you will observe retrograde motion of Venus in the planetarium.

Part 1: Overview

The first thing we'll have the planetarium do is move to our latitude (47.7º north) and a date and time just before Venus next goes into retrograde motion.

<u>Observe Venus go through retrograde.</u>

1. What horizon is Venus over at the beginning? (e.g. N, E, NE, ENE,…) _____

2. On a separate sheet of paper, sketch the shape of the path Venus followed; include a star pattern for reference.

3. What horizon is it on at the end? _____

4. In general, what direction did Venus move, toward the east or toward the west? _____

5. Did the stars move? _____

Part 2: Details

Now you'll watch it again, but the planetarium will stop at selected points for you to observe the position of the Sun on the ecliptic.

1. What does the position of the Sun on the ecliptic tell you?

2. What was the date at the beginning? _____

3. What was the date when Venus began retrograde (approximately)? _____

4. What was the date when Venus stopped retrograde (approximately)? _____

5. What was the date at the end of the demonstration? _____

6. How long did it take Venus to go through retrograde? _____

Part 3: Concluding questions

1. Can retrograde motion be observed in a single evening? Explain why or why not.

2. Does the Sun ever go through retrograde? Why or why not?

3. Will retrograde motion of the outer planets be ( ) the same as or ( ) different than the retrograde motion of Venus? Explain your logic.

4. Label the sketch you did in part 1 with 4 positions: (1) the beginning, (2) the start of retrograde, (3) end of retrograde, and (4) end of the demo. In the figure below, sketch and label the relative positions of the Earth and Venus for the same positions.

Last modified: 8/17/05

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