

Shifting to a Copernican model of the Solar System by shifting away from a Copernican model of teaching

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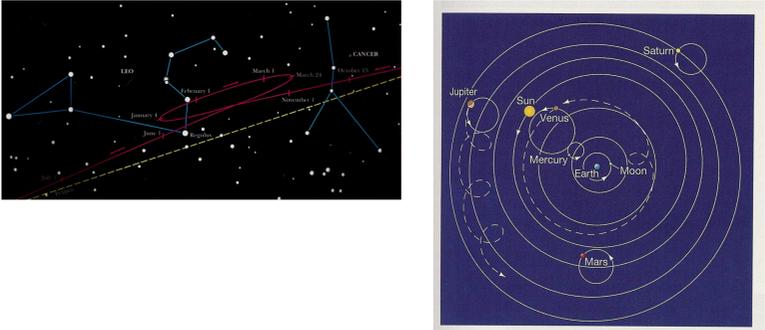
Traditional, instructor-centered lectures are like the Copernican (Sun-centered) model of the Solar System. The instructor (Sun) sits front and center in complete control while “illuminating” the students (planets), especially the ones close by. The planets have no influence on the Sun, very little interaction with each other, and no ability to move in different directions. The Copernican Revolution was a triumph for science but not for science education.

ASTR 310 (Exploring the Solar System) is a service course offered to non-Science students. This term, we concentrated on shifting the instruction from instructor-centered to student-centered. When teaching the class about the shift from the Ptolemaic (Earth-centered) model to the Copernican (Sun-centered) model of the Solar System, we saw dramatic gains in the students’ understanding the concepts after we re-wrote and re-taught the lesson in the following class.

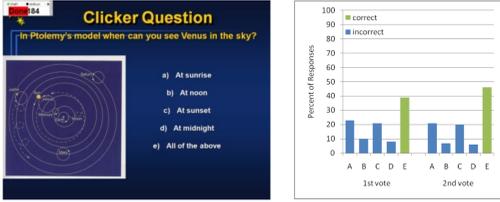
Mon, Jan 31

00 minutes • • • 05 • • • 10 • • • 15 • • • 20 • • • 25 • • • 30 • • • 35 • • • 40

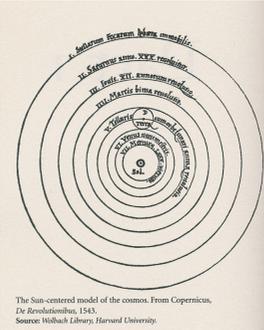
mini-lecture on observed retrograde motion of Mars and the Ptolemaic (Earth-centered) model of the Solar System



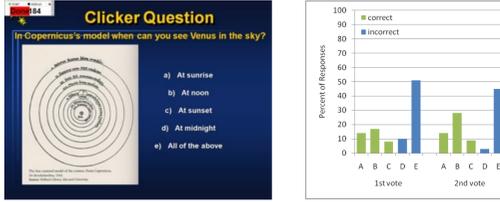
Clicker question on prediction of Ptolemaic model. After 2 votes, only 46% correct.



mini-lecture on Copernican (Sun-centered) model of Solar System



Clicker question on prediction of Copernican model. After 2 votes, still only 51% correct.

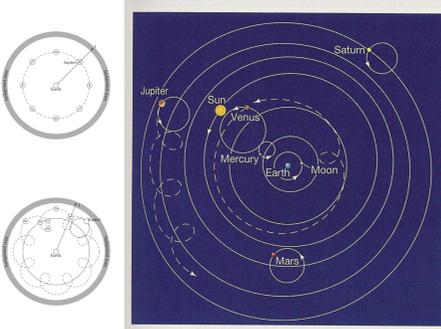


Tue, Feb 1 (Madly) re-wrote presentation to create opportunities for students to • personally explore concepts • create their own knowledge • share that knowledge with peers

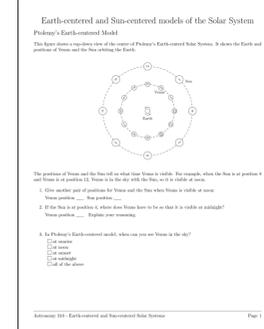
Wed, Feb 2

00 minutes • • • 05 • • • 10 • • • 15 • • • 20 • • • 25 • • • 30 • • • 35 • • • 40

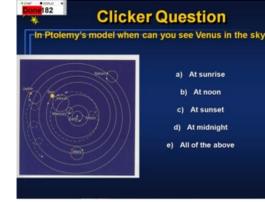
mini-lecture on Ptolemaic model using new graphics



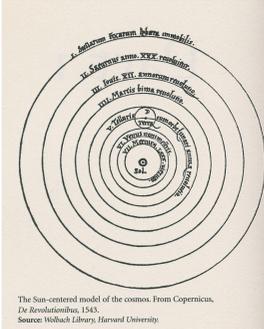
worksheet page 1, done with peers



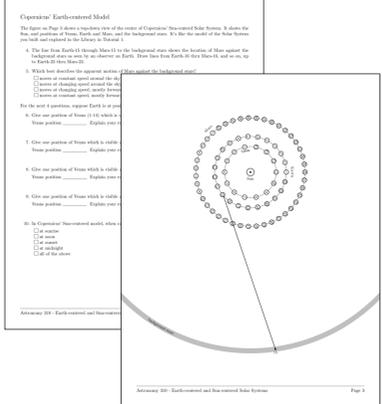
same question, 83% correct



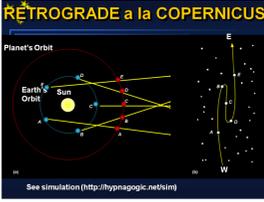
mini-lecture on Copernican model



worksheet pages 2 & 3, done with peers



animation of retrograde mot'n



same question, 97% correct.

