

Lesson Outline

Teacher Name ___Tom Moul_____

School ___Fox Chapel Area High School_____

Course Title ___Physics I - Mechanics_____

Topic/Unit ___Universal Gravitation/Planetary Motion_____

Model Topic _____

Modeling Tool ___Net Logo_____

Please provide a brief description for each section.

1. Describe the preparation you will do with the students prior to the model.

- a) Develop equations for Newton's Law of Universal Gravitation.
- b) Develop model for Circular motion and forces:
 - Diagrammatic representations (motion map and force diagram)
 - Mathematical representations (equations for force, velocity and acceleration)
 - Verbal representations (description of forces and motion of objects traveling in a circular path)

2. Describe the learning objectives related to the model and how you will achieve them.

A. Students will be asked to make both quantitative and qualitative models for planetary motion within our solar system.

Qualitative: Make force diagram, motion map and verbal representation for a generic planet orbiting the sun.

Quantitative: Calculate Forces, velocities and accelerations for each planet in the solar system (focusing on the 6 shown in Net Logo program).

B. Students will use Net Logo program to view eccentricity graphs and visual orbit paths for the 6 planets shown. Based on these observations, students will construct a qualitative "comparison model" for orbital radius, speed and eccentricity of all planets shown. Within this comparison model, students will be required to describe reasons for their conclusions. That is, they must cite evidence to support their model (i.e. reference eccentricity graphs).

3. Describe the discussion questions you will use after the model.

Sample discussion questions to be used, after the activity has been completed (or during) but before the writeup is due:

- What planet has the largest/smallest eccentricity? How do you know?
- What planet has the longest/shortest period of orbit? HDYK?
- Is the orbit for Saturn perfectly circular? How could you change the scale to show a more precise representation of the eccentricity?

4. Describe the type of student assessment you will use.

This assignment will be used as a culminating assessment for the circular motion unit. The rubric for the assessment will be developed later.