

Teacher Cirpili Beginning Date Early September

Subject Physics Day(s) 1 2 3 4 5 6 (*number of days of instruction*)

Lesson/Unit Plan Title or Theme:
Evolution of Models

Essential Question/Objective:

How have models evolved? (How can we use the library to help solve this problem)?

NYS Learning Standards and PI:

- **Standard 4, Physics**

Assessment Plan:

- **Group discussions will finally culminate in a group by group presentation.**
- **Students will also have one page summaries of their presentation which should answer questions about their models.**
 - 1) **What observations does their model explain well**
 - 2) **What observation(s) does the model not explain or are inconsistent.**
 - 3) **Did the model predict any observations that hadn't occurred (like eclipses, black holes, etc.)**
 - 4) **Was the limitation technical, intellectual or both (i.e. the instruments had not yet been built or there was a widespread belief).**
 - 5) **When did the model gain acceptance and when did the model fall out of favor**
 - 6) **What time period did the model go from and to?**
 - 7) **What other people were involved in or contributed to the model and how?**

Procedures:

- **Two groups of models, planetary models and atomic models, will be given out at random to randomly assigned groups of three (part of the beginning of the year ice-breaker activity).**
- **Students will use the online science database and be encouraged to procure a library card before they go to the library.**
- **One day of class will be in the computer lab where students will access the databases available on the www.buffalolib.org site.**
- **Further research will be on students' own time at their nearest library or at the central branch.**

Resources/Materials/Technology

- **Students may utilize the green screen in the recording studio to produce audio-visual supplements to their work. Students will be told utilizing the Launchpad will earn them extra credit.**
- **Students may use the Thingiverse database and pick an example of their model and print it on the 3-D printer for extra credit.**
- **If a student cites a library book, or one of the online databases, they will be given extra credit.**
- **If a student consults with a librarian they will receive extra credit (must be documented).**
- **Webpages on Page 2**

Summary/Closure:

Students will present their research.

Homework:

Presentation, library research and visitation.

Planetary	Atomic
Ptolemaic / Geocentric	Atomic Model / Democritus
Copernican / Heliocentric	Kinetic Theory of Gases / Dalton
Keplerian / Ellipses	Plum Pudding / Thomson
Newtonian / Gravitation & COM	Nuclear Model / Rutherford
Einsteinian / Relativistic	Planetary Model / Bohr
	Standing Wave Model / DeBroglie
	Probability Model / Schroedinger

Sample Links:

Research Start: <http://www.buffalolib.org/content/research>

Ptolemy and Star Trails: <https://youtu.be/tp6UkqIwVfk?t=35>

Platonic Solids: <https://www.thingiverse.com/thing:711099>

Schroedinger's Orbitals: <https://www.thingiverse.com/thing:1194700>

Ptolemy and epicycles: <https://www.thingiverse.com/thing:905849>

Einsteinian black hole: <https://www.thingiverse.com/thing:1065141>

Vg video on Ptolemy: <https://www.youtube.com/watch?v=wGjIT3XHb9A>

Future Project: Manhattan Project and Buffalo Connection:

LOC: <http://www.loc.gov/teachers/classroommaterials/lessons/edison/>

&: <http://www.loc.gov/teachers/primary-source-analysis-tool/>

Aside: <https://www.thingiverse.com/thing:2778891>