ESS 201 - Week 6: Due February 16

Optional Reading: “Case for Mars” by R. Zubrin

Eggonaut: Prelaunch Wednesday Feb. 16 Over by the Fountain; Wednesday Feb 23 is Launch day (weather permitting - in case of very wet weather it will be postponed until next appropriate Wednesday or Friday).

See additional handout for details of launch requirements.

Lab Work

(1) For the small CO$_2$ rockets describe why temperature of the fuel should make a difference to the speed of the rocket. Describe the experiments that were performed and whether changes in speed consistent with your predictions where observed. Are then any other factors involved in the performance of the rockets.

(2) Human exploration requires substantial more structure and fuel than an unmanned spacecraft.  
   (a) Given estimates for the weight of the water and CO$_2$ rocket cars.
   (b) Which system uses more energy, and why?
   (c) Which system uses more fuel?
   (d) Prior to launch of vehicle, which one do you expect to go the farthest and why?
   (e) Which was actually did go further?
   (f) Which one would you consider more efficient?
   (g) Is human exploration worth the additional cost? Justify your answer in a paragraph.

(3) Weather permitting: Describe the solar concentrator, how it works, and what was it able to do. Estimate how much power was it able to direct into the focus area.

Computer Set

Over the next couple of weeks you are going to build up a story for a mission to a planet (or moon of a planet). As part of this endeavor you need to research the destination and a possible means to travel to that planet.

(1) Use your favorite search engine to find identify key properties of your favorite planet or moon. Key properties that need to be discussed are
(a) Distance from the Sun

(b) Time to revolve around the Sun (i.e. length of year)

(c) Length of day and speed of rotation

(d) Gravity relative to Earth's

(e) Properties of the planet's interior

(f) Properties of the planet's atmosphere

(g) Last time visited by a spacecraft and time that spacecraft was in space before reaching the planet.

If you are stuck for a site you should try looking at the JPL site.

http://pds.jpl.nasa.gov/planets/  

http://seds.lpl.arizona.edu/nineplanets/nineplanets/  

http://nssdc.gsfc.nasa.gov/planetary/planetary_home.html  

http://www.nationalgeographic.com/solarsystem/splash.html

Additional ideas for a Mars trip can be seen at http://www.marsacademy.com/

(2) Detailed exploration of the surface of a planet may require planes flying in completely different atmospheres than on Earth. Describe three changes to plane technology that might be required for such exploration at Mars. Web sites include

http://www.space.com/businessotechnology/technology/mars_plane_020612-1.html

http://powerweb.grc.nasa.gov/doc/marsairplane.html

(3) Use the remaining time to complete design of your water rocket for testing and flight next week.