Challenge 1 - Assignment - Principles of Mechanical Design

http://www.schenectady.k12.ny.us/users/pattersont/Robotics%20Website/ProjectGuides.html

http://www.gabrielse.us/robotics/vex/assignments/vex_assignments.html









Rack and Pinion

Universal Joint

Cam and Follower

Ratchet and Pawl

Terms and Definitions

DMA (Distance Mechanical Advantage) - a condition in which a simple machine sacrifices force (input) in order to multiply distance (output)

FMA (Force Mechanical Advantage) - a condition in which a simple machine sacrifices distance (input) in order to multiply force (output)

Purpose

The purpose of this project is to provide an opportunity to work with both the quantitative and qualitative elements of mechanical design. This includes concepts related to the simple machines as well as compound machines. Since most complex mechanical design today is completed through the use of CAD or computer-aided design, you will be asked to complete a portion of this activity using INVENTOR.

Background Information

Part Name	Part Type	Picture	Characteristics
Spur Gear	Gear		 shafts are parallel to one another gears with different numbers of teeth may be meshed may create an FMA or a DMA

Bevel Gear	Gear		 shafts are perpendicular (90 degrees) to one another used to change direction only (no effect on FMA/DMA)
Rack and Pinion	Gear		 used to change rotary to linear motion pinion is the round gear, usually driving rack is the flat gear, usually driven Click <u>here</u> to see how a rack and pinion is used for car steering.
Worm and Pinion	Gear		 worm gear looks like a screw thread rotary motion in, rotary out used for large speed reduction or precise positioning
Cam	Misc.	Ć	 cam is an eccentric shape changes rotary in to reciprocating motion out amount of linear motion is called displacement
Chain & Sprocket	Misc.		 rotary motion in, rotary out shafts may be moved further apart than spur gear shafts may create a DMA or FMA
Universal Joint	Misc.		 transmits motion between two rotating shafts shafts must be at no more than a 45 degree angle to one another

---Build part of your robot design using an advanced gearing system. (Look-up design ideas online)

Due Date: January 11, 2013 – Including Website Documentation (Video, Pictures, Explanation)

Sketch Design Idea:

- Look for parts to use in Kit --
- List parts you are using for the device –
- Write the resource website below