

Homework – Ratchets, Drives and Gearing

1. Fill in the blanks for the following (20%)
 - A. Cams turn _____ rotary motion into an upward and downward motion
 - B. _____ is difference between a cam's minimum and maximum radii
 - C. Eccentricity means to be _____
 - D. Unlike cranks, cams have the ability to store _____
 - E. Cams are the _____ version of computer programs
 - F. A _____ crank converts up-down motion to side-to-side motion
 - G. A 3-bar (linkage) is for _____ motion
 - H. A slider-crank with a _____ increases lever sway
 - I. Levers move in a _____ arc
 - J. A _____ can be used to keep the lever against the cam so it follows the profile
 - K. Springs in cam-followers increase _____, so tensioners are used
2. Answer the following (10%)
 - A. List, sketch and give examples of the 4 types of springs
 - B. Explain how cams examples of memory and storage
3. Define (1 to 2 sentences), describe (1 to 3 paragraphs) and provide sketches to support you definitions and descriptions for the following (10%)
 - A. Lobe Cams
 - B. Dwell (or Pause)
 - C. 3-bar linkages
4. Sketch and describe the 4 cycles of a 3-bar linkage. In your sketch show where the straight line motion is and in your description, explain how the straight motion arises (10%)
5. An example of the common car windshield wiper (2 blades) is shown. Before searching, think and sketch how you think the wiper works; what is the input and output? Next, do a web search to study how wipers work. Construct a Lego-based version using an NXT motor and NxC program. Create Build Instructions as a 4-step build plan (one a single slide). Capture a 10-second YouTube video of your wiper in action (25%)



6. Use Bricklink Studio to create build instructions for the Lego-based folding chair assembly. Recall, you constructed this assembly for a previous Homework assignment. Grading will depend on how easily one can recreate your assembly using only the build instructions (25%)